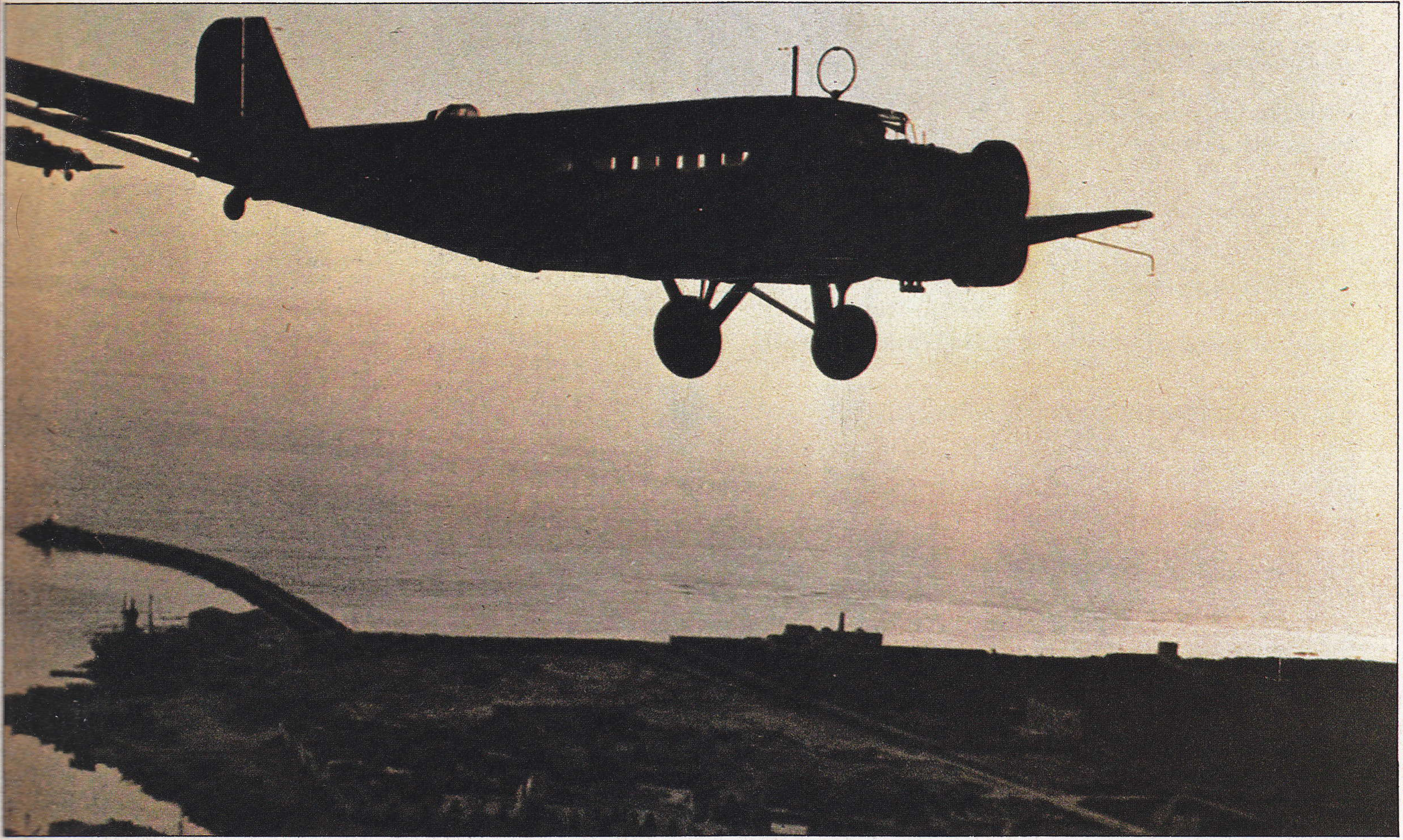
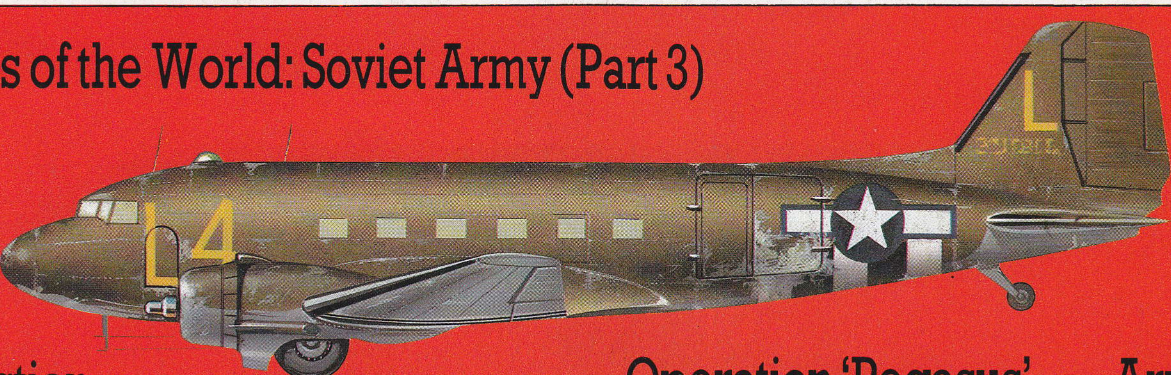
The world's most comprehensive encyclopedia of the military weapons of the 20th century

WAR MACHINE

An ORBIS Publication
89
90p
IR £1.15 Aus $2.15 NZ $2.65 SA R2.45 Sing $4.50



Armed Forces of the World: Soviet Army (Part 3)



Iron Annie:
The Ju 52 in Action

Operation 'Pegasus'

Arnhem

A fully illustrated guide to Transport and Assault Aircraft of World War II

WAR MACHINE

Volume 8 **Issue 89**

Published by
Orbis Publishing Ltd
© Aerospace Publishing Ltd 1985
Colour profiles, diagrams and cutaway drawings © Pilot Press Ltd

Editorial Offices
War Machine
Aerospace Publishing Ltd
179 Dalling Road
London W6 0ES

Managing Editor: Stan Morse
Editorial: Trisha Palmer
Chris Bishop
Chris Chant
Ian Drury

Design: Rod Teasdale
Colour Origination: Imago Publishing Ltd, Thame, Oxon

Typesetting: SX Composing Ltd

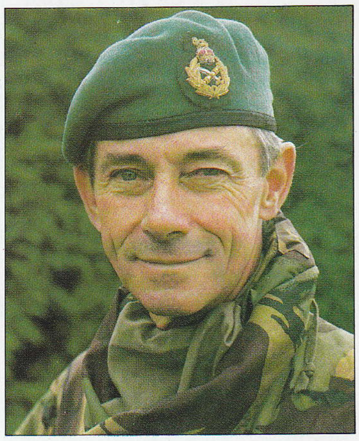
Film work: Precise Litho Ltd

Artists:
Keith Fretwell
Keith Woodcock

16855

Printed in Great Britain
by The Artisan Press Ltd

Subscription Manager: Christine Allen
0488 72666



Consultant Editor: Major General Sir Jeremy Moore KCB OBE MC, Commander of British Land Forces during the Falklands campaign.

Distribution and marketing offices:
Orbis Publishing Ltd
Orbis House
20-22 Bedfordbury
London WC2N 4BT
Telephone: 01-379 6711

Circulation Director: David Breed
Marketing Director: Michael Joyce

WAR MACHINE
Forthcoming issues feature:
Airships
Armoured Cruisers of World War I
Half Tracks of World War II
Modern Towed Anti-Aircraft Weapons
Tank Destroyers of World War II

Picture acknowledgements

Cover photograph: John MacClanoy Collection. **1761:** John MacClanoy Collection/John MacClancy Collection. **1762:** US Air Force. **1763:** US Air Force/US Air Force/McDonnell Douglas. **1764:** RAF Museum, Hendon. **1765:** RAF Museum, Hendon. **1766:** US Air Force/US Air Force/US Air Force. **1767:** Bruce Robertson/Bruce Robertson. **1768:** Imperial War Museum. **1769:** Robert Hunt Library. **1772:** John MacClancy Collection. **1774:** Imperial War Museum. **1775:** Bruce Robertson. **1776:** RAF Museum, Hendon/RAF Museum, Hendon. **1777:** US Air Force/Imperial War Museum. **1779:** Imperial War Museum. **1780:** RAF Museum, Hendon/Imperial War Museum. **(iii):** R.F./Novosti Press Agency. **(iv):** US Department of Defense/US Department of Defense.

HOW TO OBTAIN ISSUES AND BINDERS FOR WAR MACHINE

Issues can be obtained by placing an order with your newsagent or direct from our Subscription Department. If you have difficulty obtaining any back issues from your newsagent, please write to us stating the issue(s) required and enclosing a cheque for the cover price of the issue(s).

AUSTRALIA please write to: Gordon and Gotch (Aus) Ltd, 114 William Street, PO Box 767G, Melbourne, Victoria 3001. MALTA, NEW ZEALAND, SINGAPORE & SOUTH AFRICA: Back numbers are available at cover price from your newsagent. In case of difficulty, write to the address given for binders.

UK/EIRE
PRICE: 90p/IR£1.15
SUBSCRIPTION:
6 Months: £26.00
1 Year: £52.00
BINDER: Please send £3.95 per binder, or take advantage of our special offer in early issues.

EUROPE
PRICE: 90p
SUBSCRIPTION:
6 Months air: £44.72
surface: £36.14
1 Year air: £89.44
surface: £72.28
BINDER: (inc. Postage)
air: £5.50
surface: £5.00

MALTA
Obtain BINDERS from your newsagent or Miller (Malta) Ltd, MA Vassalli Street, Valetta, Malta
Price: £3.95

MIDDLE EAST
PRICE: 90p
SUBSCRIPTION:
6 Months air: £50.18
surface: £36.14
1 Year air: £100.36
surface: £72.28
BINDER: (inc. Postage)
air: £8.25
surface: £5.50

AMERICAS/ASIA/AFRICA
PRICE: US$1.95/90p
SUBSCRIPTION:
6 Months air: £59.24
surface: £36.14
1 Year air: £119.08
surface: £72.28
BINDER: (inc. Postage)
air: £9.50
surface: £5.50

SOUTH AFRICA
PRICE: SA R2.45
Obtain BINDERS from any branch of Central News Agency or Intermag, PO Box 57394, Springfield 2137

SINGAPORE
PRICE: Sing$4.50
Obtain BINDERS from
MPH Distributors
601 Sims Drive
03-07-21
Singapore 1438

AUSTRALASIA/FAR EAST
PRICE: 90p
SUBSCRIPTION:
6 Months air: £64.22
surface: £36.14
1 Year air: £128.44
surface: £72.28

AUSTRALIA
PRICE: AUS $2.15
Obtain BINDERS from
First Post Pty Ltd,
23 Chandos Street
St Leonards,
NSW 2065

NEW ZEALAND
PRICE: NZ $2.65
Obtain BINDERS from your newsagent or
Gordon & Gotch (NZ) Ltd, PO Box 1595,
Wellington

ADDRESS FOR BINDERS AND BACK ISSUES
Orbis Publishing Limited
Orbis House
20-22 Bedfordbury
London
WC2N 4BT
Telephone: 01-379-5211

Cheques/Postal Orders should be made payable to Orbis Publishing Limited. Binder prices include postage and packing and prices are in sterling.

Back Issues are sold at the cover price, and we do not charge carriage in the UK.

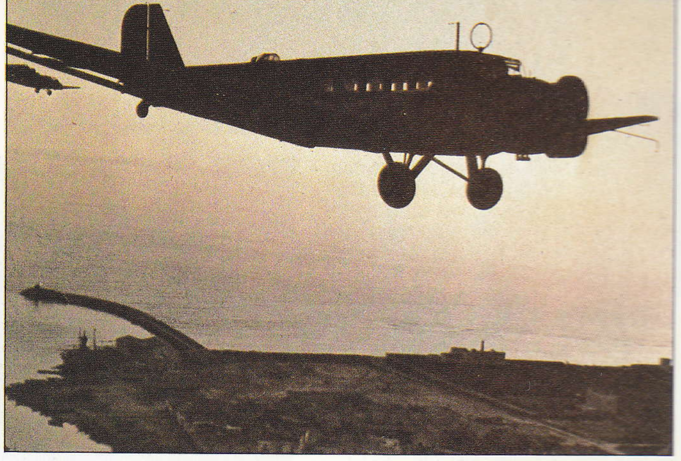
NOTE
Binders and back issues are obtainable subject to availability of stocks. Whilst every attempt is made to keep the price of the issues and binders constant, the publishers reserve the right to increase the stated prices at any time when circumstances dictate. Binders depicted in this publication are those produced for the UK and Australian markets only. Binders and Issues may be subject to import duty and/or local taxes, which are not included in the above prices unless stated.

ADDRESS FOR SUBSCRIPTIONS
Orbis Publishing Limited
Hurst Farm
Baydon Road
Lambourne Woodlands
Newbury
Berks
RG16 7TW
Telephone: 0488-72666

All cheques/Postal Orders should be made payable to Orbis Publishing Limited. Postage and packaging is included in subscription rates, and prices are given in Sterling.

Transport and Assault Aircraft of World War 11

Military transport aircraft made a significant breakthrough during World War II by delivering forces direct to the battlefield from the air: the ultimate expression of mobile warfare.



The most important Luftwaffe transport of the war, the Junkers Ju 52 carried German paratroops into action for their famed attacks in the Low Countries, Scandinavia and Crete. Easy to fly and of notably tough construction, nearly 5,000 examples were produced before the end of the war.

'We ought to have a corps of at least 5000 parachute troops.' Thus wrote Winston Churchill to his chief of staff on 22 June 1940, the message in effect giving birth to the British airborne division.

It has long been the dream of military men to transport large numbers of soldiers by air, and at least one Napoleonic print exists showing this being achieved across the English Channel, each man under his individual balloon. However, it was the Soviet Union that gave the dream substance, and during the summer manoeuvres of 1936 a demonstration drop of 1,200 men complete with 150 machine-guns served to impress the world.

Even so, Nazi Germany was swiftly capable of imitating the idea and it was her paratroops and a new method of transporting armed men, by means of towed gliders, that first saw both methods in action in the opening months of World War II, the lessons learned being applied to the large action in Crete.

Hitherto, transport aircraft had been used only as aerial troop carriers, but now a new role awaited them, that of air-landing operations in which soldiers were disembarked directly under fire on to enemy territory. All three methods were used on a scale hitherto only imagined when the UK, the USA and their allies invaded the continent of Europe in 1944, moving by air not only men and arms, but also heavy equipment and vehicles, some (like the human loads) even being deposited by parachute.

Although made as perfect as seemed possible, the susceptibility to error of these schemes was brought sharply home by the Arnhem operation, while the aerial movement of armies had spawned a whole range of ancillary systems such as the reclaiming of gliders by the snatch method. After almost 200 years the dream had become reality.

In a scene typical of a Luftwaffe airfield during the swift advances and retreats by the Wehrmacht in World War II, Junkers Ju 52/3ms of the Transportverband deliver stocks of fuel, spares and other vital material to combat units close to the front line.

USA

Curtiss C-46 Commando

In common with its more prolific contemporary, the Douglas C-47, the **Curtiss C-46 Commando** was initially developed for the civil market, in the shape of the **CW-20** prototype which first flew on 26 March 1940 on the power of two 1193.1-kW (1,600-hp) Wright Cyclone 586-C14-BA2 engines. The aircraft featured a twin-finned tail unit but this was soon changed to a large single unit. In September 1940 a large order was placed for a militarized version which was to be designated C-46 and powered by the Pratt & Whitney Double Wasp.

Quickly following the C-46 was the main production version, the **C-46A**, which featured double cargo doors and a hydraulic winch. This allowed the crew to load the aircraft without ground assistance. Other main versions were the **C-46D** with revised nose and doors for paratroop operations, and the **C-46F** which introduced more powerful engines and blunted wing tips. The **C-46E** sported a stepped windscreen.

In service the C-46 proved reliable and able to carry much greater loads than the C-47, and the large-diameter cabin allowed awkward items to be carried. The cabin floor was strengthened to allow the airlift of light vehicles and artillery.

The C-46 entered service in mid-1942 and was used initially on local duties. Its operations were soon extended to cover the South Atlantic routes supplying the Allied troops in North Africa but it was in Europe and the Far East that the aircraft was used extensively, its most famous route being over the 'Hump' between India and China. This consisted of mountainous passes and treacherous makeshift airfields, the cargoes often consisting of ammunition and fuel. The C-46 was used in most of the 'trucking' operations during the last two years of the Pacific war in the hands of the US Army Air Force and the US Marine Corps (designated **R5C-1**), and the end of hostilities in the Far East spelt the end of production for this hard-working beast of burden. A total of 3,180 C-46s was built, and many of these continued in US service throughout Korea until the early days of the Vietnam conflict. A handful continue in small-scale civil freighting today.

On account of its better performance at altitude than the C-47/53 Skytrain, the Curtiss C-46 Commando was extensively used by the USAAF in the Pacific theatre and for the supply of war matériel from India to China over the 'hump'. Here Indian troops embark in a C-46A.

Specification

Curtiss C-46 Commando

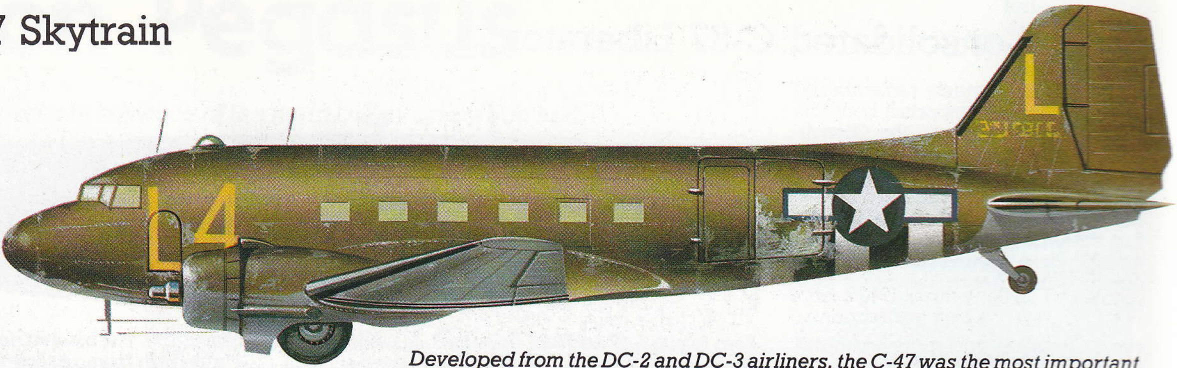
Type: paratroop and general transport
Powerplant: two 1491.4-kW (2,000-hp) Pratt & Whitney R-2800-43 18-cylinder air-cooled radial piston engines
Performance: maximum speed 425 km/h (264 mph) at 3962 m (13,000 ft); service ceiling 8412 m (27,600 ft); range 3701 km (2,300 miles)
Weights: empty 13374 kg (29,485 lb); maximum take-off 21773 kg (48,000 lb)
Dimensions: span 32.92 m (108 ft 0 in); length 23.27 m (76 ft 4 in); height 6.71 m (22 ft 0 in); wing area 126.16 m^2 (1,358 sq ft)
Armament: none

Seen here flying above the Himalayas (the famous 'hump' between India and China), the Curtiss C-46 Commando was capable of carrying 50 troops, compared with about 28 by the C-47.

USA

Douglas C-47 Skytrain

Probably the best known transport aeroplane of all time, whether as an airliner or military transport, the **Douglas C-47 Skytrain** evolved from the **DC-3** airliner which introduced new levels of speed and comfort to travel during the late 1930s. First flown as a commercial aircraft on 17 December 1935, the C-47 was not ordered by the US Army Air Corps until 1940, the airline interior giving way to bucket seats along the cabin sides, and Pratt & Whitney R-1830 radials replacing the DC-3's Wright Cyclones. Some 93 C-47s were built before production switched to the **C-47A** with 24-volt in place of 12-volt electrical system; a total of 4,931 C-47As was built. High-altitude superchargers and R-1830-90 engines were introduced in 3,241 **C-47B** aircraft (including 133 **TC-47B** trainers) intended for use in South East Asia. Many other variations were produced under separate designations, of which the **C-53 Skytrooper** was the most important, being in effect an airline standard aircraft for military purposes. Wartime military production of the C-47 reached 10,048, plus an estimated 2,700 produced in the Soviet Union as the **Lisunov Li-2**. It was also produced in Japan as the L2D. In the USAAF the C-47 became the standard transport and glider tug in service from 1942 onwards, being flown in large numbers in every airborne forces operation during the war; furthermore, some 1,895 Dakotas served with 25 RAF squadrons, the **Dakota Mk I** corresponding to the C-47, the **Dakota Mk II** to the C-53, the **Dakota Mk III** to the C-47A and the **Dakota Mk IV** to the C-47B. As late as 1961 the USAF still had over 1,000 C-47s on its inventory, and the type was also used by the US Navy as the **R4D** in several variants.



Developed from the DC-2 and DC-3 airliners, the C-47 was the most important transport in the Allied inventory by the time of the invasion of France.

Specification

Douglas C-47 Skytrain (Dakota Mk I)

Type: three-crew 27-troop military transport

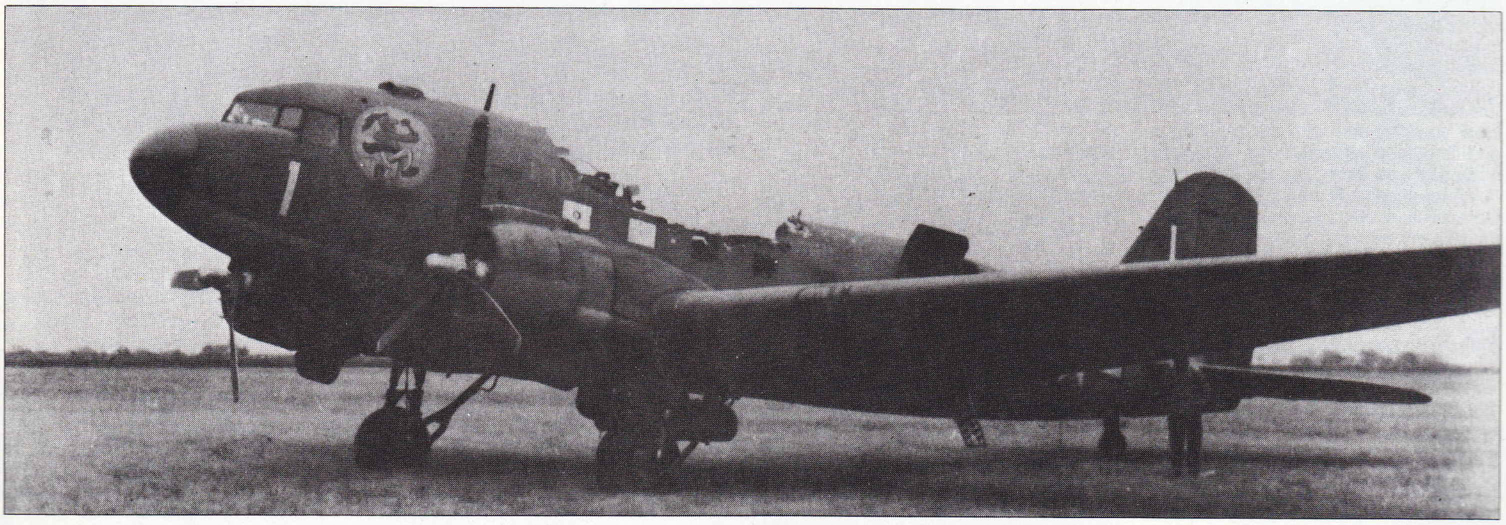
Powerplant: two 894.8-kW (1,200-hp) Pratt & Whitney R-1830-92 14-cylinder radial piston engines

Performance: maximum speed 370 km/h (230 mph) at 2591 m (8,500 ft); climb to 3048 m (10,000 ft) in 9.6 minutes; service ceiling 7315 m (24,000 ft); range 2575 km (1,600 miles)

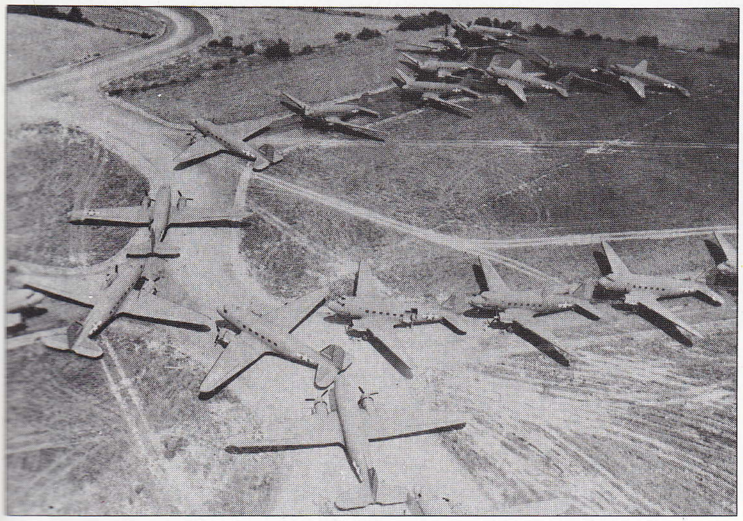
Weights: empty 8255 kg (18,200 lb); maximum take-off 11793 kg (26,000 lb)

Dimensions: span 29.11 m (95 ft 6 in); length 19.43 m (63 ft 9 in); height 5.18 m (17 ft 0 in); wing area 91.69 m^2 (987.0 sq ft)

Armament: none



Above: The C-47/Dakota gained affection borne of familiarity among Allied troops the world over, affectionately dubbed 'Old Bucket Seats' and 'Gooney Bird'. Shown here is a USAAF aircraft in South East Asia that survived a suicide ramming by a Japanese fighter.

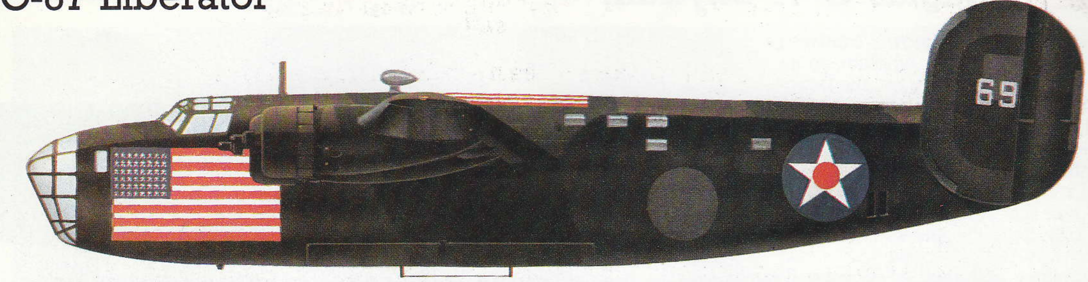


A sight typical of any one of a score of airfields in Britain occupied by the C-47s and C-53s of the US IX Troop Carrier Command in 1943-4. At peak strength the command in Britain fielded 52 squadrons in 13 groups, with almost 900 C-47s/53s. This picture was taken early in 1944.

A C-47B Skytrain, the version developed specifically for flights over the 'hump' to China. In the opinion of General Dwight D. Eisenhower the C-47 joined the bazooka, jeep and atomic bomb as the Allied weapons that contributed most to the victory in World War II.

USA

Consolidated C-87 Liberator



Both the USAAF and RAF flew the B-24 Liberator as VIP transports. The aircraft depicted here, an LB-30B diverted from an RAF order to an early USAAF contract, was a VIP transport based at Bolling Field, Washington, in the autumn of 1941. The prominent American flag marking was applied to emphasize America's neutrality at that time.

Whilst it is most widely remembered as one of the most important bombers to see wartime service, the Consolidated B-24 Liberator also saw extensive use as a transport. Initial deliveries were to the British airline BOAC in March 1941; designated LB-30A, the first six aircraft were later transferred to RAF Ferry Command, along with aircraft subsequently delivered from the USA.

By June 1941, the US Air Corps Ferrying Command was receiving B-24A transports, these being similar in configuration to the LB-30As, and going on to see extensive wartime service around the world.

From those initial models, plans were put in hand to produce a dedicated transport variant, this taking shape in 1942 as the C-87, a development of the B-24D; 287 were ordered by the USAAC.

Apart from use by the US Army and US Navy (**RY**), this **Consolidated C-87** version of the Liberator was also used by the RAF which flew its **Liberator C.Mk VII** transports for air trooping on an extensive scale. The purpose of this new mobility was at first the necessity of moving men to India for operations against the Japanese and the repatriation of time-expired troops; six RAF Liberators were earmarked for the work in company with Short Stirlings and Douglas Dakotas, there being two each of these latter types.

With room for 38 men and stores, the capacious ex-bomber was the subject for several experiments into the new art of mass-transportation of troops, so that two were the subject of trials after the war to compare the advantages of matting (on which the men could lie) with those of conventional seats. But the design was not without its problems, such as a weak nose wheel, so swift had been the C-87's development.

Specification
Consolidated C-87 Liberator

Type: air trooping and cargo transport

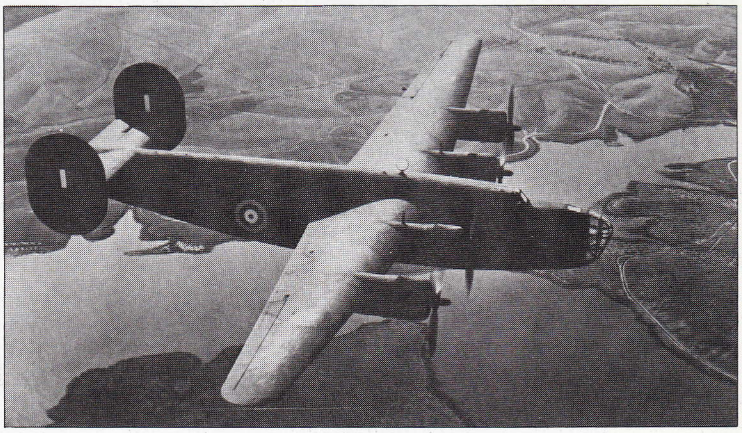
Powerplant: four 894.8-kW (1,200-hp) Pratt & Whitney Twin Wasp R-1830-43 14-cylinder air-cooled radial piston engines

Performance: maximum speed 435.5 km/h (270 mph) at 6096 m (20,000 ft), service ceiling 9754 m (32,000 ft); range 3685 km (2,290 miles)

Weights: empty 16783 kg (37,000 lb); maximum take-off 28123 kg (62,000 lb)

Dimensions: span 33.53 m (110 ft 0 in); length 20.45 m (67 ft 1 in); height 5.46 m (17 ft 11 in); wing area 97.55 m^2 (1,050 sq ft)

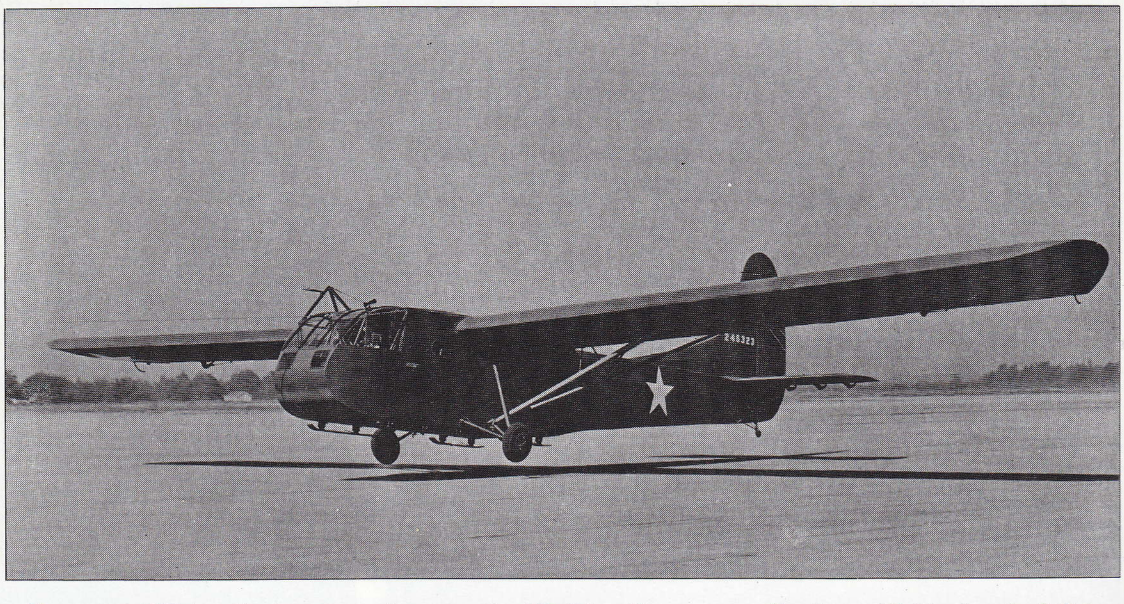
Armament: none



Utilizing the aircraft's long range, RAF Transport Command used various versions of the Consolidated Liberator, converted for trooping and staff transport. Flying the command's routes between the UK, the Middle East and the Far East, these makeshift transports served with the RAF's Nos 46 and 229 Groups.

USA

Waco CG-4A Hadrian



Smaller and lighter than the British Horsa glider, the American Waco Hadrian could carry 15 troops, a standard Jeep or a 75-mm howitzer and crew. Towed by C-46s and C-47s, Hadrians took part in landings in Sicily, Burma, Normandy, Holland and in the Rhine crossing. A total of 12,393 was delivered.

The only US glider to see combat service, the **Waco CG-4A** (known to the British as the **Hadrian** and to the Americans as the **Haig**) was constructed from steel tube and wood (covered with fabric) with a large hinged nose to allow the loading and unloading of light vehicles, although the type could also be used for the transport of 15 fully armed troops who travelled seated on benches along the fuselage walls.

Developed from the smaller **XCG-3**, which seated only nine, the CG-4A, or 'Jayhawk' as it was nicknamed, was produced in large numbers at several plants, Beech, Boeing, Cessna and Ford all being involved, while the subassemblies were the products of often quite small cabinet-making firms.

Hadrians were first used in an operation by British and American airborne forces, when they were employed in the preliminary assaults of 1943 which led to the capture of Sicily during that summer. A second claim to history was made in July of the same year when a British-operated Douglas Dakota towed one in stages from Montreal to England in a total flying time of 28 hours over the distance of 5633 km (3,500 miles). A load of vaccines for the USSR formed the cargo.

A number of experiments were carried out to investigate the possibility of producing a powered version, and to this end different engines (including the Franklin four-cylinder horizontally-opposed type) were tried out, a pair of engines being fitted to the wing struts. None of these **PG** variants entered full production.

Two years of CG-4 production saw a total of 12,393 delivered, and several thousand of the type were in use in 1944 and 1945, not only for the D-Day landings, but also for the Rhine crossing. Later, a vast number was taken to the Far East as a preliminary to the planned invasion of Japan; had these been used, it seems likely that some would have been towed in side-by-side pairs in the manner reported by observers of the D-Day assault. An improved version built in limited numbers was the **CG-15A**, with span reduced to 18.95 m (62 ft 2 in), a revised nose and cantilever landing gear.

Specification
Waco CG-4A

Type: troop and supply glider

Performance: maximum towing speed 201 km/h (125 mph)

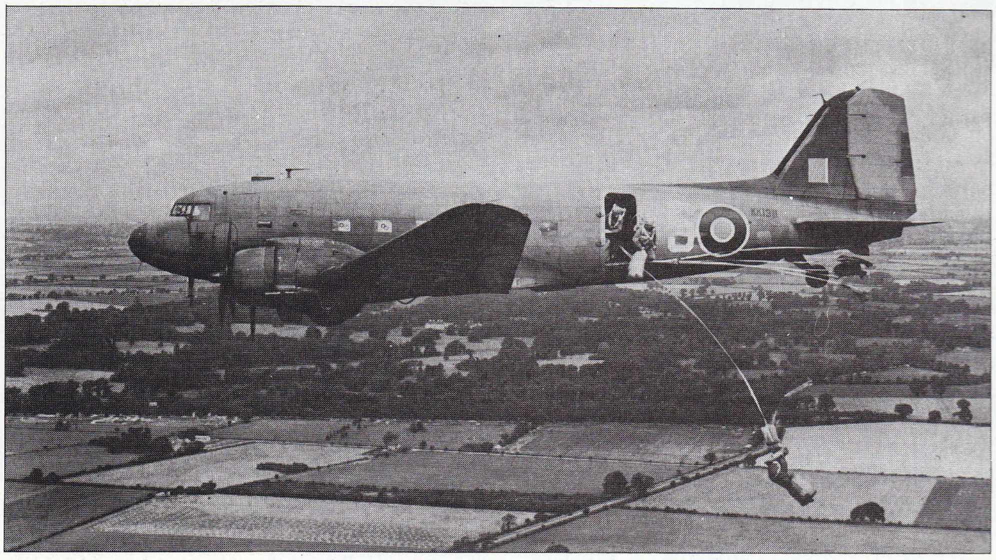
Weights: empty 1719 kg (3,790 lb); maximum take-off 4082 kg (9,000 lb)

Dimensions: span 25.50 m (83 ft 8 in); length 14.73 m (48 ft 3.75 in); height 3.85 m (12 ft 7.5 in); wing area 83.61 m^2 (900 sq ft)

Armament: none

Operation 'Pegasus'

The landing of large airborne forces in advance of the main D-Day operation had considerable advantages for the Allies, spreading confusion among the German defences and hampering attempts to deal with the main invasion force. But the assault from the air was a bold gamble.



Dropping from an RAF Dakota on exercise, a paratrooper is having his chute extracted by static line (attached to the aircraft) while another exits the aircraft.

Allied preparations for the invasion of the continent of Europe had begun, it might be argued, soon after the Nazi occupation, but a convenient date somewhat later may be chosen, namely that in May 1943 when the British 6th Airborne Division was formed. But at that time there was no chance of very complete training due to the fact that an indispensable part of the organization, No. 38 Wing of the RAF, was still in Africa.

Training was at first slowed by a shortage of aircraft, but after a time glider formations were slowly increased in size until by November 1943 as many as 40 might be involved with their tugs, while methods of marshalling them had been perfected.

Four months earlier the idea of dropping paratroops in front of the seaborne invaders in the Caen-Bayeux area had been evaluated, but it was considered that lightly-armed paratroops would be unable to offer serious resistance to the enemy's more powerful armour. Landing zones for gliders were also picked out, but subsequent photographs showed that many poles had been set up as obstructions at these points and parachute troops were substituted wherever possible, these choosing suitable areas for their gliderborne reinforcements.

Naturally, as May moved into June 1944 the question of the weather was of paramount importance. Selection of this had to be something of a compromise since conditions ideal for ships might not be so for aircraft, and in this way 5 June was tentatively chosen. However, the forecast for 4 June was unfavourable and a delay of 24 hours was ordered, but conditions were sufficiently questionable that the Nazi forecasters discounted even 6 June as a probable date.

Paratroops of the 3rd and 5th Brigades were to drop in the early hours of D-Day north east of Caen, while others were to take the area in the vicinity of Carentan; gliders meanwhile would also be directed to these areas. The flightpaths for the Caen paratroop aircraft crossed the English coast west of Newhaven, while that of the tugs skirted Le Havre almost as far as Rouen before taking a reciprocal course; for the Carentan force the route lay south west from Weymouth before changing direction to pass north east of the Channel Islands. Having released their gliders, the tugs of this force were to round the eastern extremity of the Cherbourg peninsula en route for their bases.

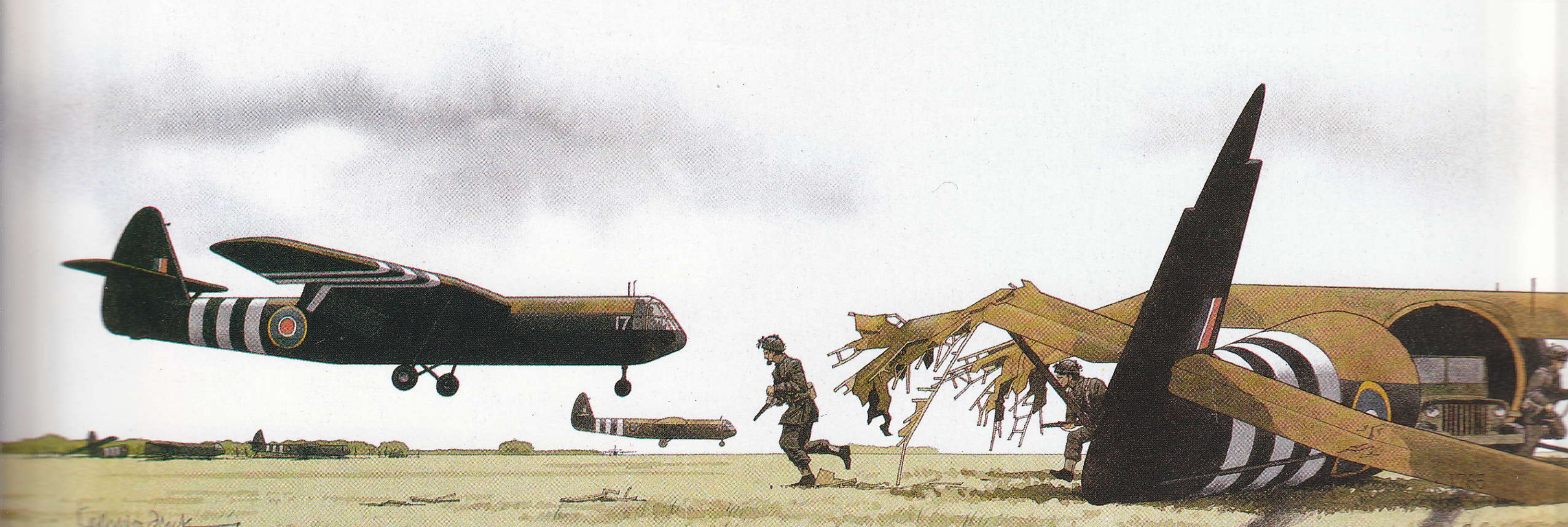
All the aircraft for these operations were found by Nos 38 and 46 Transport Groups. The first of these had 10 squadrons (four with Armstrong Whitworth Albemarles, another four with Short Stirlings and two with the Handley Page Halifax); five squadrons of Douglas Dakotas made up No. 46 Group, the total number of aircraft involved being 423. All these carried the 'Gee' navigational aid (well-tried by Bomber Command) together with 'Rebecca 2', the short-range homing device which enabled them to maintain communication via the 'Eureka' beacons that had to be set up by the 22nd Independent Parachute Company from the pathfinder aircraft. In this way accurate homing on the three dropping zones was expected.

Pathfinder departure

The 22nd IPC took off in six Albemarles from Harwell at exactly three minutes before midnight on 5 June, and with the company as the aircraft climbed into the clear, moon-lit sky were Squadron Leader Merrick DFC and Air Vice-Marshal Hollinghurst to oversee the pathfinder operation. At first all seemed to be going well. But over the target, at exactly 00.20, though three of the aircraft made several runs of the DZ only one stick of men landed correctly. This was not all: the visual and radar beacons for the 1st Canadian Parachute Battalion were all either lost or damaged, with the result that some of the pathfinders landed in areas overlapping adjacent zones. Nevertheless, there were sufficient for the positions eventually to be consolidated.

Meanwhile, just before 23.02 on the night of 5 June a force of six Airspeed Horsa and Halifax combinations had taken off and climbed to an altitude of about 1525 m (5,000 ft) in patchy cloud, crossing the French coast about 00.09

The glider troops were important to the 6th Airborne Division; it was primarily the gliders that carried any heavy equipment assigned to the operation.



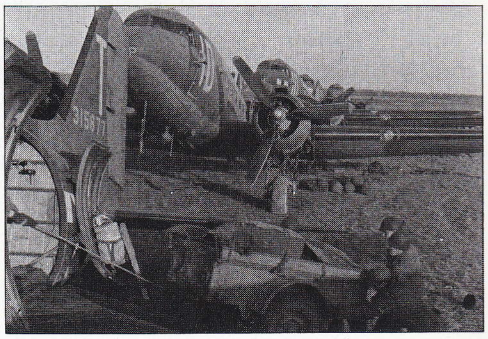
C-47 Skytrains carry out a massed paratroop drop. Being despatched from a single side door in the fuselage, sticks of paratroops became extended over a long distance, compounding problems of assembly on the ground into tight fighting units.

hours on the following day, their number now reduced to five, one having become lost. The trio directed to the bridge over the Caen Canal landed successfully, Horsa PF800 within yards of this feature. Here the expected poles had not yet been erected, but some of the landings were nonetheless rough; however, in a matter of moments the men were out of the doors already opened on the final run in, and were rushing the bridge, coming under immediate fire as they did so.

So swift had been the assault that the position was soon taken, but the heavy weapons had now to be unloaded from the gliders as quickly as possible since a counterattack was inevitable. When it came, it was led by three old French tanks that had been captured earlier in the war, and one of these was hit and set on fire, burning for more than an hour, though the sound of the exploding ammunition gave the men storming the bridge over the Orne a few hundred yards to the east the impression that a prolonged battle was raging.

Here too the gliders had landed accurately, the objective being taken and the position consolidated. The sappers meanwhile made the surprising discovery that neither of the bridges had been mined by the enemy.

Meanwhile the expected reinforcements from the 7th Light Infantry Battalion of the Parachute Regiment had not arrived: they had drifted beyond the designated DZ because of a stronger than forecast wind, and a number of men had been killed in the air. Thus it was that the sound of the regimental call echoed through the night as a bugler sounded this as a rallying note at regular intervals for the force of not more than 200 men. By 02.15 this had attracted only about 80 of the men, and the commander, unsure of their position, had to wait until a chance flare picked out the church at Ranville to serve as a landmark. But by then a welcome signal had come over the field radios, one that announced victory at the bridgehead they were expected to reinforce and one that enabled the men of the 7th Battalion thankfully to discard their heavy assault boat equipment. 'Ham and jam' came the code over the crackling radio, indicating that the bridge was held. 'Ham and jam' the metallic voice announced as the men doubled towards their colleagues' position, 'Ham and bloody jam!'

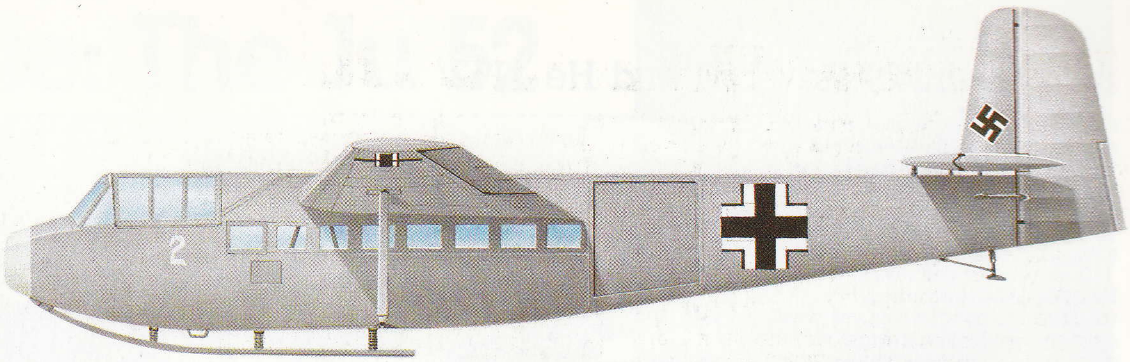


Above: Military equipment is loaded aboard C-47s at a 9th Troop Carrier Command base in 1944. Although the C-47 was widely used as a troop transport and paratroop carrier, the difficulty of loading vehicles – by side doors – made such cargoes less common.

Below: An early wartime photo shows C-47-DL Skytrain transports towing Hadrian gliders during a training exercise in America. Glider pilots usually adopted a slightly higher position than illustrated here so as to avoid the discomfort caused by the tug's slipstream.

GERMANY

DFS 230



Above: First assault glider used by any air force was the DFS 230A, of which this example was allocated to I Gruppe, Luftlandgeschwader 1 for the invasion of Crete in 1941. Though small in size, the DFS 230A could carry 10 troops and 275 kg (606 lb) of military equipment.

What was to become Nazi Germany's chief troop glider for a substantial part of the war years was designed before 1937, when the **DFS 230** was demonstrated to senior officers who were impressed by the quick deployment of its eight-man load when the glider landed, having cast off from a Junkers Ju 52/3m at 1000m (3,280 ft). Thus a production contract quickly followed, a small glider command being formed in the next year.

The **DFS 230A-1** initial production model made history on 10 May 1940 when the fort of Eben-Emael on the strategic perimeter of the Albert Canal in Belgium was captured in the early hours of the morning with little resistance after a gliderborne party of assault engineers had landed on its roof. This was the first time in history that gliders had been used in action and the sortie was sufficient to prove that troops delivered to a target in this way had distinct advantages over paratroops; both types shared the common factor of a silent approach, but all the gliderborne troops were concentrated at a single point and wasted no time in linking up.

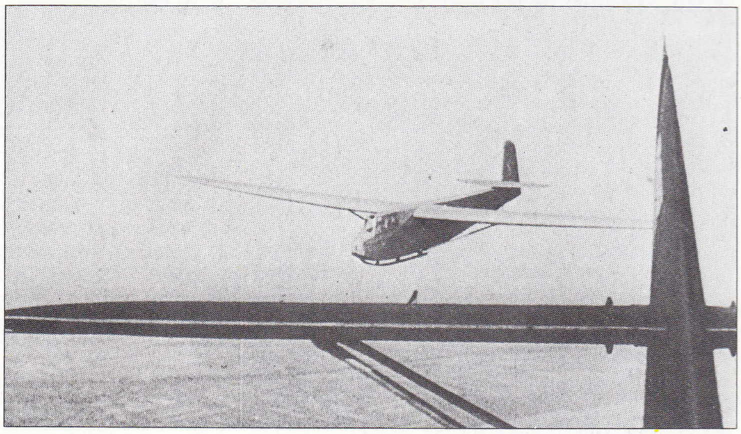
However, the major action in which the DFS 230 was deployed was certainly that carried out exactly a year later when Crete was invaded, the numbers involved being indicated by the fact that the lead group alone was made up of 53 of these aircraft. On the other hand, the losses sustained were such that an operation of this type was never again attempted.

One reason for the enormous waste of life and matériel had been the small capacity of the DFS, and reports current at the time spoke of trains of up to six gliders being towed by a single Junkers Ju 52/3m, although the usual number was two or three. The **DFS 230B-1** was similar to the DFS 230A-1 but for a braking parachute and provision for defensive armament.

DFS gliders were also used in North Africa, but probably the most interesting operation in which they were involved was the rescue of the imprisoned Mussolini from the Rifugio Hotel, Abruzzi by a party dropped from 12 DFS **230C-1** gliders (each with three braking rockets in the nose), the Italian dictator then being flown out in a Fieseler Storch. A later version, the **DFS 230F-1**, had a capacity of 15 men but it was not produced in numbers.

Specification

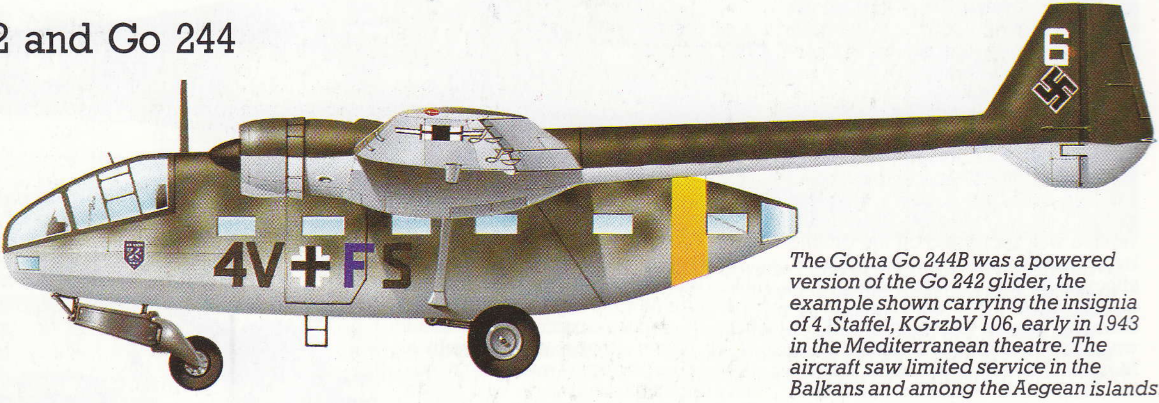
DFS 230A-1
Type: troop glider
Performance: maximum towing speed 210 km/h (130 mph)
Weights: empty 860 kg (1,896 lb); maximum take-off 2100 kg (4,630 lb)
Dimensions: span 20.87 (68 ft 5.7 in); length 11.24 m (36 ft 10.5 in); height 2.74 m (8 ft 11.9 in); wing area 41.3 m^2 (444.56 sq ft)



The German eight-man DFS 230A glider featured in the first-ever assault by glider-borne troops when 41 of these aircraft carried some 300 members of Sturm-Abteilung Koch into action against Fort Eben-Emael and other key targets in Belgium on 10 May 1940. The DFS 230A also participated in the costly invasion of Crete.

GERMANY

Gotha Go 242 and Go 244



The Gotha Go 244B was a powered version of the Go 242 glider, the example shown carrying the insignia of 4. Staffel, KGrzbV 106, early in 1943 in the Mediterranean theatre. The aircraft saw limited service in the Balkans and among the Aegean islands.

Capable of carrying either 21 troops and their equipment or a military vehicle, the **Gotha Go 242** with its capacious central pod and twin booms offered obvious advantages over the small DFS 230 in that its capacity was something like three times greater.

Early models of both the freighter (**Go 242A-1**) and troop (**Go 242A-2**) versions appeared with rather crude landing gears but 1942, the year when the first examples were entering service, saw the introduction of a more refined landing gear with sprung oleo legs at each side (**Go 242B-2**). Additionally, the Gotha was the subject of trials of various rocket units to assist take-off, and was developed as the **Go 242B-2** and **Go 242B-3** paratroop versions with a large loading door at the rear, while the **Go 242C** version had a hull and floats so that landings on water were possible.

Some 1,500 Go 242 were delivered, the first operational use of these being made in the Middle East, but of this total 133 were converted to **Go 244** standard.

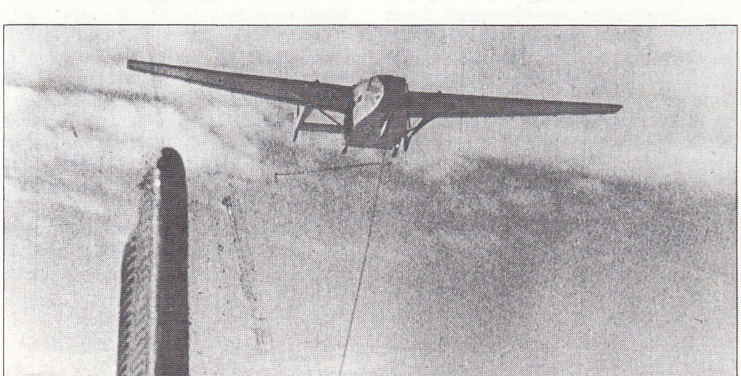
This was a powered glider version with tricycle landing gear and two engines mounted on forward extensions of the tail booms, the first examples of this type being delivered to operational units in Crete and Greece in March 1942. Some also formed the equipment of transport *Geschwader* in the Middle East and southern USSR, but on the former front they proved vulnerable to anti-aircraft fire and were withdrawn, being replaced by Junkers Ju 52/3m or Messerschmitt Me 323 transports.

Although the engines of most Go 244s were of French origin, some captured Soviet engines were tried, and plans were submitted for nose-mounted single-engine versions powered by the Argus As 10C or Junkers Jumo 211. Other developments included a pair designated **Go 245** which would have had Argus pulsejets mounted under the wings and a conventional fuselage.

Specification

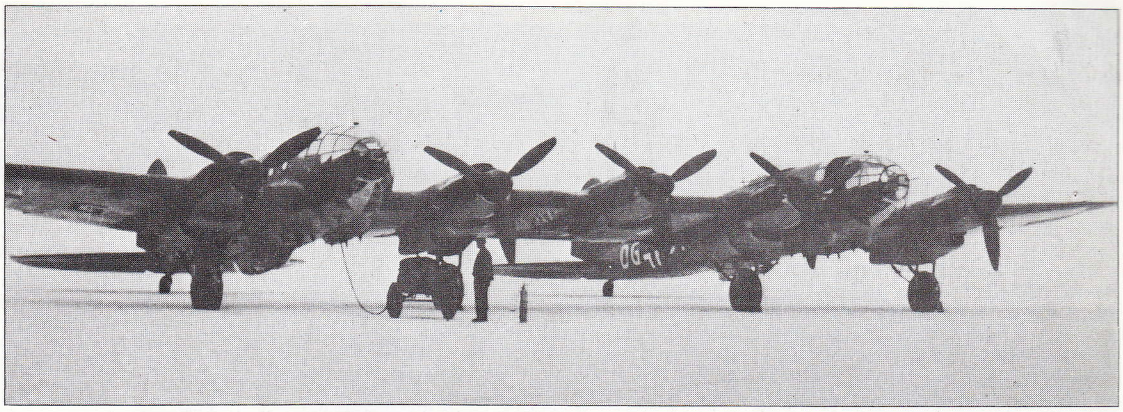
Gotha 244B
Type: transport
Powerplant: two 850.1-kW (1,140-hp) Gnome-Rhône 14N 14-cylinder air-cooled radial piston engines
Performance: maximum speed 290 km/h (180 mph) at 3000 m (9,843 ft); service ceiling 7500 m (24,607 ft); range 740 km (460 miles)
Weights: empty 5100 kg (11,244 lb); maximum take-off 7800 kg (17,196 lb)
Dimensions: span 24.50 m (80 ft 4.6 in); length 15.80 m (51 ft 10 in); height 4.70 m (15 ft 5 in); wing area 64.4 m^2 (693.2 sq ft)
Armament: four manually-operated 7.92-mm (0.312-in) MG34 machine-guns

Capable of lifting a standard Kübelwagen or 21 fully-armed troops, the Gotha Go 242 was Germany's most-used glider, more than 1,500 being produced. Seldom – if ever – used for assault, the Go 242 was, however, employed on the Eastern Front, the Balkans, Sicily and the Western Desert in support of the Wehrmacht in the field.



GERMANY

Heinkel He 111H and He 111Z



Originally built as a bomber and used as a civil transport, the Siegfried and Walter Günther **Heinkel He 111** design is better known as a bomber, so it is something of a surprise to learn that with the development of the special transport matters had come full circle.

The designation of this variant was **He 111H-20/R1**, which was built from the outset as a paratroop transport with accommodation for 16 men, and as such had a ventral jump hatch and external racks for two 800-kg (1,764-lb) supply containers. Similar to this type was the **He 111H-20/R2**, the glider tug version, although it was also capable of employment as a freighter. Armament included an electrically-operated dorsal turret with a 13-mm (0.51-in) MG131 machine-gun.

The suffix of these designations indicated that the necessary changes were carried out by means of *Rüstsätze*, or standard equipment sets, and this is also true of the earlier **He 111H-16/R2**, which was fitted with boom-type glider-towing gear in the rear of the fuselage. Other conversions were the **He 111H-11/R2** glider tug, and the **He 111H-23** for eight paratroops.

Yet probably the strangest version of the basic He 111 design was that which became known as the **He 111Z-1**, consisting of two He 111H airframes joined by a special centre section containing a fifth Jumo liquid-cooled motor, so that a span of 35.20 m (115 ft 5.8 in) resulted, as did a loaded weight of 28500 kg (62,832 lb). The task for this model was to tow the huge Messerschmitt Me 321 glider, or even three Gotha Go 242s, although the maximum speed possible when this was done was a mere 225 km/h (140 mph).

Historically the Heinkel transport is of interest in that the type was responsible for one of the last paratroop operations of the war. This took place when aircraft of TGr 30 based at Grossostheim dropped men behind the Allied lines in 1944 during the battle of the Ardennes.

Specification

Heinkel He 111H-16/R

Type: glider tug and paratroop transport

Powerplant: two 1006.7-kW (1,350-hp) Junkers Jumo 211F-2 12-cylinder liquid-cooled piston engines

Performance: maximum speed 400 km/h (249 mph) at 6000 m (19,685 ft); service ceiling 6700 m (21,982 ft); range 1950 km (1,212 miles)

Weights: empty 8680 kg (19,136 lb); maximum take-off 14000 kg (30,865 lb)

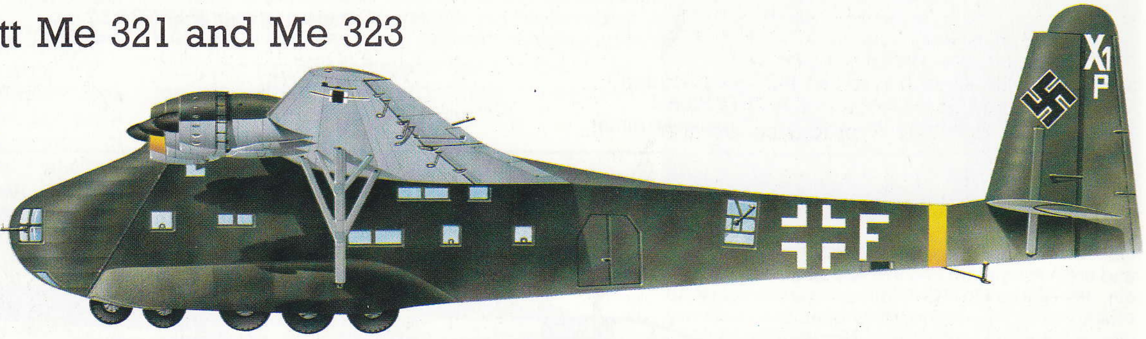
Dimensions: span 22.60 m (74 ft 1.8 in); length 17.50 m (57 ft 5 in); height 4.40 m (14 ft 5.2 in); wing area 87.6 m^2 (942.9 sq ft)

Armament: one 13-mm (0.51-in) MG131 in electrically-operated dorsal turret, and one 20-mm MG FF cannon in nose

One of the war's strangest expedients was the Heinkel He 111Z (Zwilling, or Twin), consisting of two He 111s joined together with a new centre wing section and a fifth engine. The Z-1 glider-tug saw limited service behind the Eastern Front, capable of towing the huge Me 321 or three Go 242 gliders.

GERMANY

Messerschmitt Me 321 and Me 323



The six-engine Me 323 transport normally carried up to about 120 troops, though in emergencies about 200 could be crammed in. The aircraft here was an Me 323E with a defensive armament of six machine-guns and two 20-mm cannon.

Making its first flight in March 1941 behind a Junkers Ju 90 tug, the **Messerschmitt Me 321** (a massive welded steel and wood glider with mixed ply and fabric covering) had surprisingly only one pilot on board, a man of sufficient stature to use the controls by physical means alone since there was no power assistance, although later three crew members became the accepted complement.

Designed to transport a company of soldiers, or an anti-aircraft gun, or a tracked vehicle or the equivalent weight of freight, the **Me 321A** initial version was supported on the ground by a multi-wheel bogie at each side, although in the later **Me 321B** a more conventional type with two large-diameter wheels was adopted. Even with a tow provided by means of three Messerschmitt Bf 110s or one Heinkel He 111Z, there was often insufficient power to lift the huge glider off the ground, so auxiliary rockets were provided. Trials were also made with pulsejets to increase range after release from the tow.

This problem led to the evolution of the similar **Me 323D** 'powered glider' series with six piston engines and a suitably-strengthened airframe, although the prototype was fitted with only four motors. Structurally similar to the earlier design, all the powered variants retained the clamshell doors in the nose and reverted to the bogie landing gear, and in this form the type was capable of providing transport for a minimum of 130 troops and a crew which was now increased to five on the **Me 323D-6** variant which appeared in December 1942. The additional members were a pair of engineers to look after the problem of engine synchronization, while in the later **Me 323E-1** version with engines of increased power this number was augmented by a further pair of men to operate an extra two gun turrets.

Production was planned to continue into 1945, but it in fact ceased in the spring of the previous year when less than 200 examples had been delivered of the powered type, a design which (like its predecessor) was understandably unpopular with those who had to fly it and which proved devastatingly vulnerable to fighter interception.

Specification

Messerschmitt Me 323D-6

Type: heavy transport

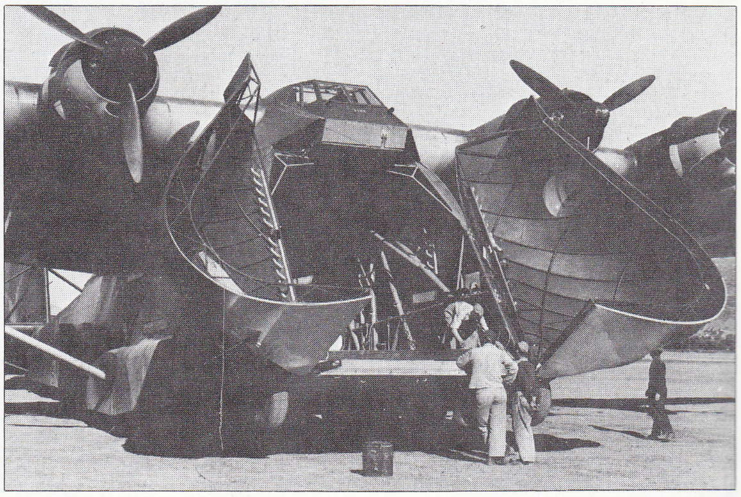
Powerplant: six 850.1-kW (1,140-hp) Gnome-Rhône 14N 14-cylinder air-cooled radial piston engines

Performance: maximum speed 285 km/h (177 mph) at sea level; range 1100 km (684 miles)

Weights: empty 27330 kg (60,252 lb); maximum take-off 43000 kg (94,799 lb)

Dimensions: span 55.00 m (180 ft 5.4 in); length 28.15 m (92 ft 4.3 in); height 8.30 m (27 ft 2.8 in); wing area 300 m^2 (3,229.3 sq ft)

Armament: varied, but frequently consisted of a maximum of 10 7.92-mm (0.312-in) MG34 or 42 machine-guns aimed through the sides of the fuselage, and five of similar calibre in the nose and upper fuselage



Born of desperation, the huge six-engine Messerschmitt Me 323 transport was never intended for front-line service, being employed for movement of supplies and reinforcements behind the Eastern Front. When indeed they were used to support the doomed Axis forces in Tunisia in 1943 they were decimated by Allied fighters over the sea.

Iron Annie: The Ju 52 in Action

Slow but extremely tough, the Junkers Ju 52/3m was by far the most important transport operated by the Luftwaffe, and when Germany first deployed her airborne forces it was the old 'Iron Annie' that carried them into action.

It had many names, the big, comparatively lumbering tri-motor monoplane with the corrugated skin: Tante Ju (Aunt Junkers), Iron Annie or just Pava (turkey), but whatever it was called, it is certainly true that its story is inseparable from the history of World War II.

A high proportion of the 1,600 aircraft that took part in the invasion of Poland in Operation 'Weiss' (white), when the first Nazi forces crossed the frontier without the formality of a declaration of war on 1 September 1939, were Junkers 52s. But these machines were employed entirely as troop carriers and, vulnerable targets as they seemed to the defenders, the sheer weight of their numbers ensured success against an air force that could muster a total of only 400 aircraft of all types.

It was left, therefore, until Operation 'Weserübung' (Weser crossing), the invasion of Denmark and Norway at the beginning of April in the following year, to see the first proposed use of the Junkers 52 (an inaccurate but accepted generic term for the Ju 52/3m) as a carrier of paratroops. Previously, this branch of the Nazi armed forces had been the subject of considerable propaganda, a large number of photographs having been issued to show men in training. Oddly enough, some countries where these were circulated chose to believe that they illustrated aircrew practising escape techniques.

The German use of paratroops in Scandinavia was most carefully planned, and on paper seemed to illustrate the ideal operation of its kind: first, Ju 52s of 5. and 6.KGrzbV 1 (the 5th and 6th *Staffeln* of the 1st transport *Geschwader*) were to drop men of 1/FJR 1 to capture Fornebu Airport at Oslo and these, once the objective had been secured, were to be reinforced by more men as Junkers transports from KGrzbV 103 landed to disgorge troops from II/IR 324.

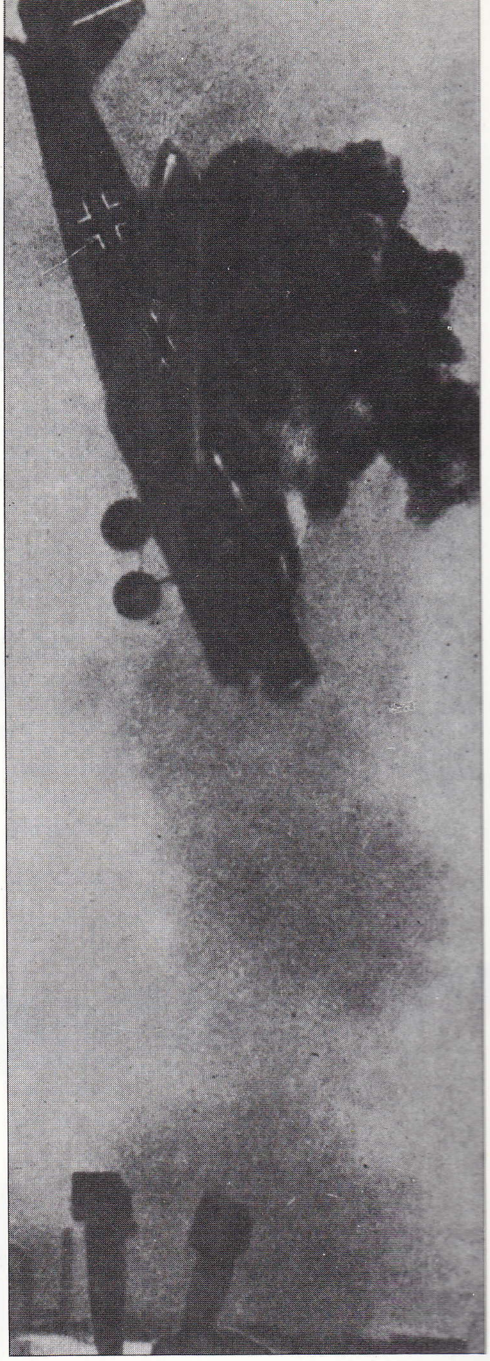
In the event, it was the weather which defeated the first assault by paratroops: conditions deteriorated so far that no air drop could be made, leaving it to subsequent men to take the airport where the Junkers aircraft, of which 573 had been earmarked for the invasion, were forced to land while it was still in Norwegian hands. Thus the first operation of World War II to see the successful use of paratroops dropped from the Junkers 52 was the assault on Stavanger-Sola Airport.

Further pioneer work for the Ju 52 followed a little later when in the following month orders were received to launch Operation 'Gelb' (yellow), the invasion of the Low Countries and France. It was 04.34 on the morning of Friday 10 May when 41 of the type started to take off, each with a DFS 230 glider in tow, the first use of troops delivered by this means in history. That this attack was successful may be judged from the fact that when the men from the surviving nine of the 11 gliders that had set out finally landed, they found that their task of demolishing the outer fortifications of the Belgian fortress of Eben-Emael met little resistance, so bewildered were the defenders.

Junkers 52s used as glider tugs for sorties of this type flew without any additional internal load, and formated in the traditional 'vic' pattern at about 175 km/h (109 mph). Their gliders were at the end of a tow rope between 60 and 120 m (197 and 394 ft) in length. Released at an altitude of perhaps 3000 m (9,843 ft), a DFS 230 was quite capable of covering about 55 km (34 miles) in the right conditions, before finally touching down at about 65 km/h (40 mph) for a landing run that might be as short as 20 m (66 ft). To achieve this latter feat it was not uncommon for barbed wire to be bound about the landing skid to act as a crude brake.

The military load that a Ju 52 hauled on such occasions was a maximum of about 1065 kg (2,348 lb), made up perhaps of a mortar with its crew and ammunition, and a rifleman-pilot plus one other and a handcart; or nine soldiers with some 3,000 rounds of ammunition and a field radio; or a machine-gun with its crew and ammunition, and four riflemen with their weapons and anti-tank grenades.

Quite rightly, the Junkers 52 has become synonymous with German airborne assault operations, since it was used for these almost to



The Luftwaffe's universal transport was the three-engine Junkers Ju 52/3m, affectionately known as Tante Ju ('Auntie Junkers'). Such an aircraft, almost certainly hit by Soviet ground fire, is seen here moments before crashing in front of Wehrmacht troops in the frozen hell of Stalingrad.

GERMANY

Junkers Ju 52/3m

The first version of what was to become one of the most famous transport aircraft in history made its maiden flight in 1930 as a single-engine design known as the **Junkers Ju 52**, and it was only after the number of motors was increased that the suffix indicating the modification was added to indicate the tri-motor **Ju 52/3m**.

In 1934 the first military version appeared as the **Ju 52/3m g3e**, and although these were intended as bombers they were pressed into service as troop transports on the Nationalist side in the Spanish Civil War for the movement into Southern Spain of 10,000 troops from Morocco. Five years after the first Luftwaffe variant had been introduced, the type was in service in such numbers that all but a handful of the troop carriers engaged in the first operations against Poland were of this type.

Probably the most important variant was the **Ju 52/3m g7e** with its widened doors to admit 18 fully-equipped troops, but when this was followed on the production lines by the **Ju 52/3m g8e** there proved to be only small differences such as 633.8-kW (850-hp) BMW 132Z engines as an alternative, armament including a 13-mm (0.51-in) defensive gun in the dorsal position and unspatted wheels. The wheel spats had usually been discarded on earlier versions in service since they tended to fill with mud and so add considerably to maintenance problems.

The **Ju 52/3m g9e** entered production in 1942, and for the first time the basic design was fitted with a glider-towing hook during manufacture, although a large number had previously been similarly equipped at station level.

With the fuselage constructed about four longerons with transverse channel-section frames under the patent skinning, 'Iron Annie' was of remarkably robust construction. Consequently, it was well suited to the hazardous task of setting men down in concentrated groups in a wide variety of battle areas, as well as dropping sticks of 12 paratroops.

Specification

Junkers Ju 52/3m g7e

Type: glider tug, parachute and general transport

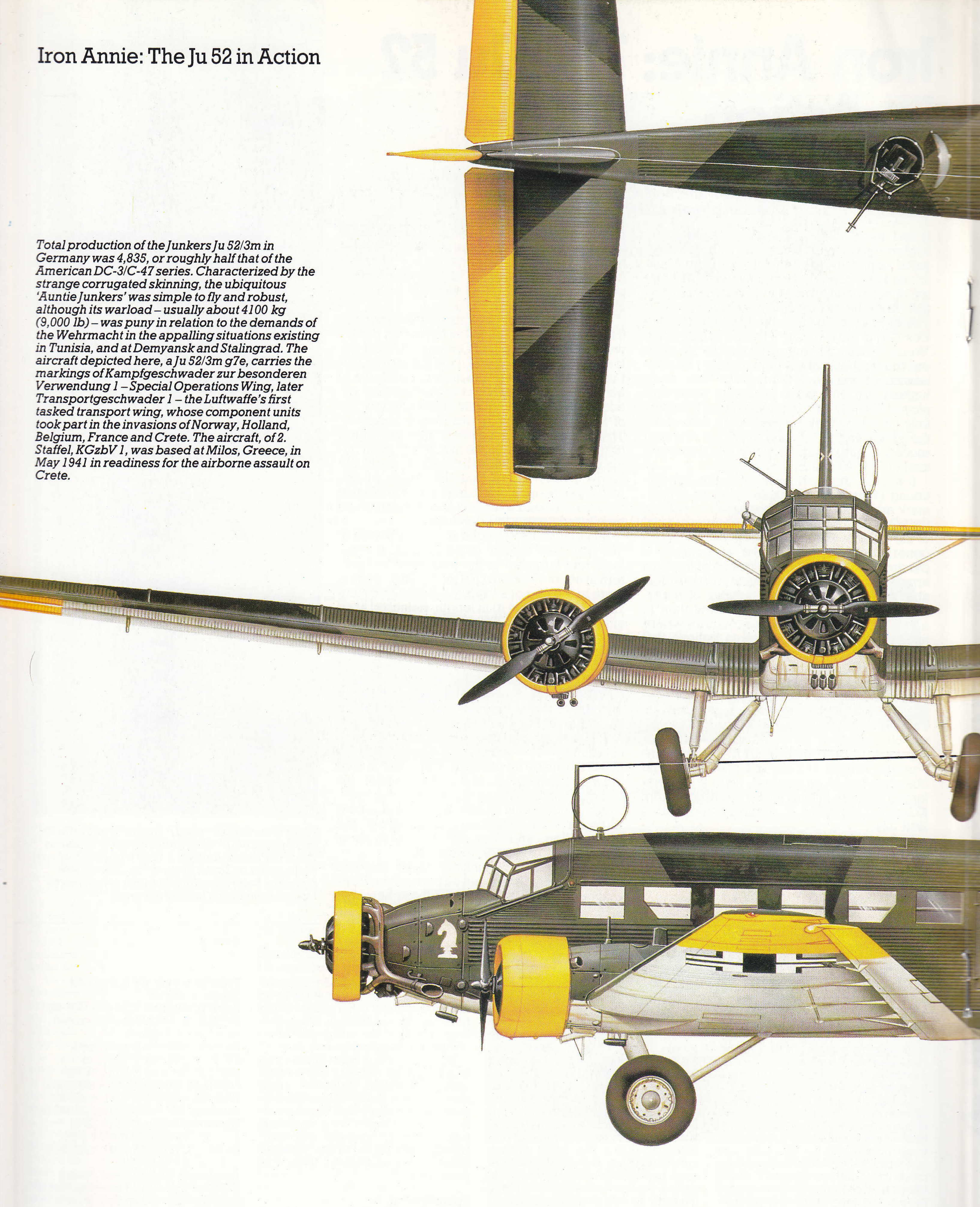
Powerplant: three 618.9-kW (830-hp) BMW 132T-2 9-cylinder air-cooled radial piston engines

Performance: maximum speed 270 km/h (168 mph) at 2750 m (9,022 ft); service ceiling 5500 m (18,045 ft); range 1280 km (795 miles)

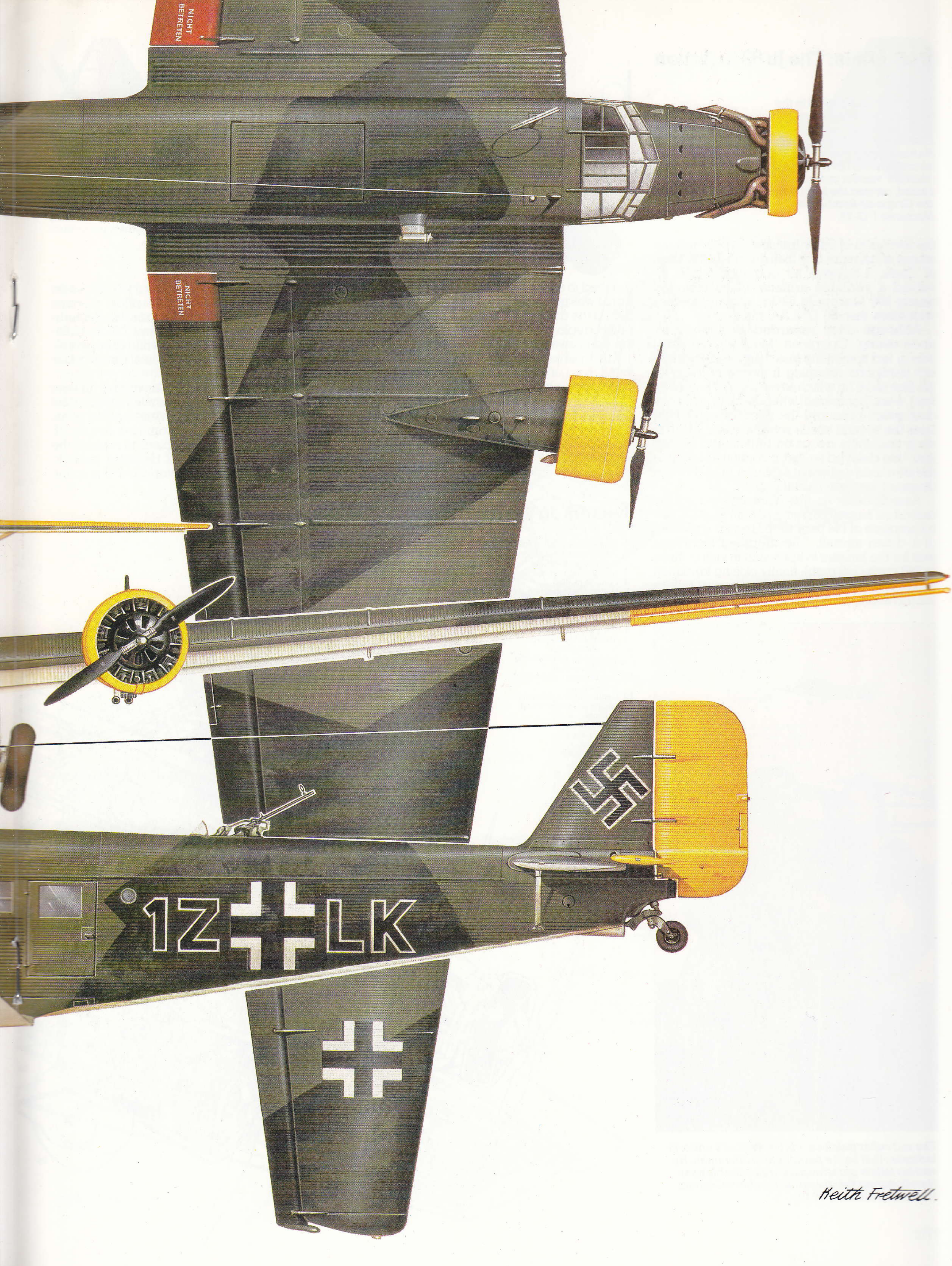
Weights: empty 6510 kg (14,352 lb); maximum take-off 10500 kg (23,149 lb)

Dimensions: span 29.25 m (95 ft 11.6 in); length 18.90 m (62 ft 0 in); height 4.50 m (14 ft 9.2 in); wing area 110.5 m^2 (1,189.45 sq ft)

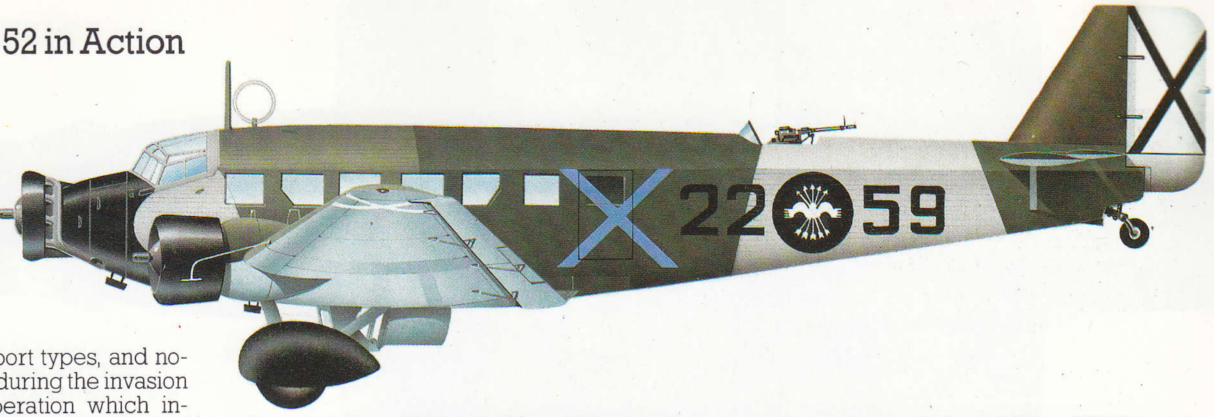
Armament: usually three 7.92-mm (0.312-in) MG15 machine-guns, one in the dorsal position and one at each side, aimed through the windows



Total production of the Junkers Ju 52/3m in Germany was 4,835, or roughly half that of the American DC-3/C-47 series. Characterized by the strange corrugated skinning, the ubiquitous 'Auntie Junkers' was simple to fly and robust, although its warload – usually about 4100 kg (9,000 lb) – was puny in relation to the demands of the Wehrmacht in the appalling situations existing in Tunisia, and at Demyansk and Stalingrad. The aircraft depicted here, a Ju 52/3m g7e, carries the markings of Kampfgeschwader zur besonderen Verwendung 1 – Special Operations Wing, later Transportgeschwader 1 – the Luftwaffe's first tasked transport wing, whose component units took part in the invasions of Norway, Holland, Belgium, France and Crete. The aircraft, of 2. Staffel, KGzbV 1, was based at Milos, Greece, in May 1941 in readiness for the airborne assault on Crete.


NICHT BETRETEN
NICHT BETRETEN
1Z LK
Keith Fretwell

Iron Annie: The Ju 52 in Action



Early Ju 52/3ms served in the Spanish Civil War, not only with the German Legion Condor but with the Spanish Nationalist Air Force; the aircraft shown here, with 'dustbin' ventral gun position raised, carried the insignia of the Grupo de Bombardeo Nocturno 1-G-22.

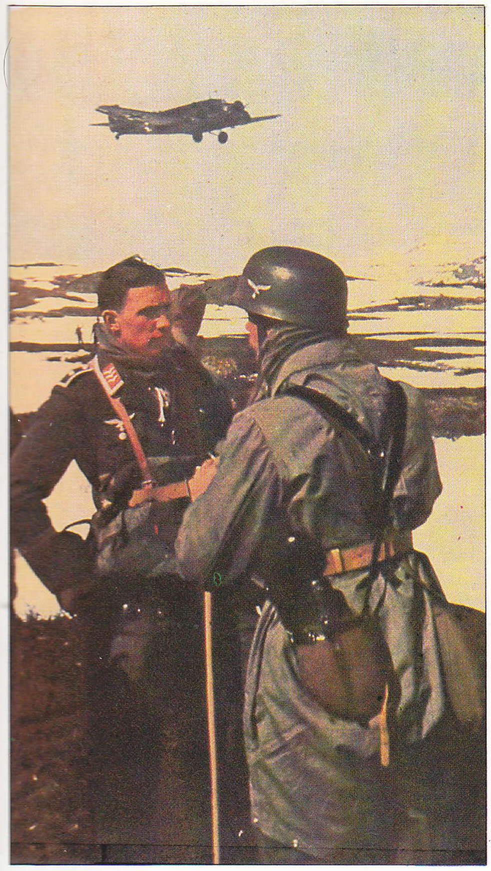
the exclusion of other transport types, and nowhere is this more true than during the invasion of Crete, a massive air operation which involved a veritable armada which included nearly 500 Junkers Ju 52/3m aircraft together with more than 80 DFS 230 gliders.

Although often regarded as a textbook undertaking, Operation 'Merkur' (Mercury) was in fact something less than ideal, for Junkers transports returning from the delivery of the first wave (in which seven aircraft had been lost) were hampered when landing in heavy dust which obscured the pilots' view. A little later the second attack scheduled for 13.00, to drop parachute troops on Retimo and Heraklion, was delayed so that it continued late into the afternoon and about a quarter of all the men dropped became casualties.

Assaults such as this were carried out by individual aircraft carrying 12 men each, so that a *Kompanie* of 144 paratroops required a *Staffel* of a dozen aircraft. The dropping technique was for the Junkers to approach in vics of three at 240 km/h (149 mph), finally closing formation to a distance of some 55 m (180 ft) apart before losing height to 120 m (394 ft). Speed was then reduced to about 160 km/h (99 mph) before the signal was given for the men to jump. This they did via the door on the port side, their canopies being deployed by static lines which pulled the bags away.

Principal equipment of these men, who were found by Luftwaffe units in nearly all cases (army troops being used for air-landing operations), consisted of a 9-mm (0.354-in) Luger pistol (with two additional 8-round magazines), although the men forming advance parties often carried grenades and sub-machine guns. Simultaneously with their drop, the Junkers transports would release four brightly coloured containers of about 136 kg (300 lb) each. In these were such items as rifles, mortars, machine-guns and ammunition. Light anti-aircraft guns, anti-tank guns and 7.5-cm (2.95-in) infantry guns were meanwhile dropped by other Ju 52s with the assistance of three or four parachutes per package.

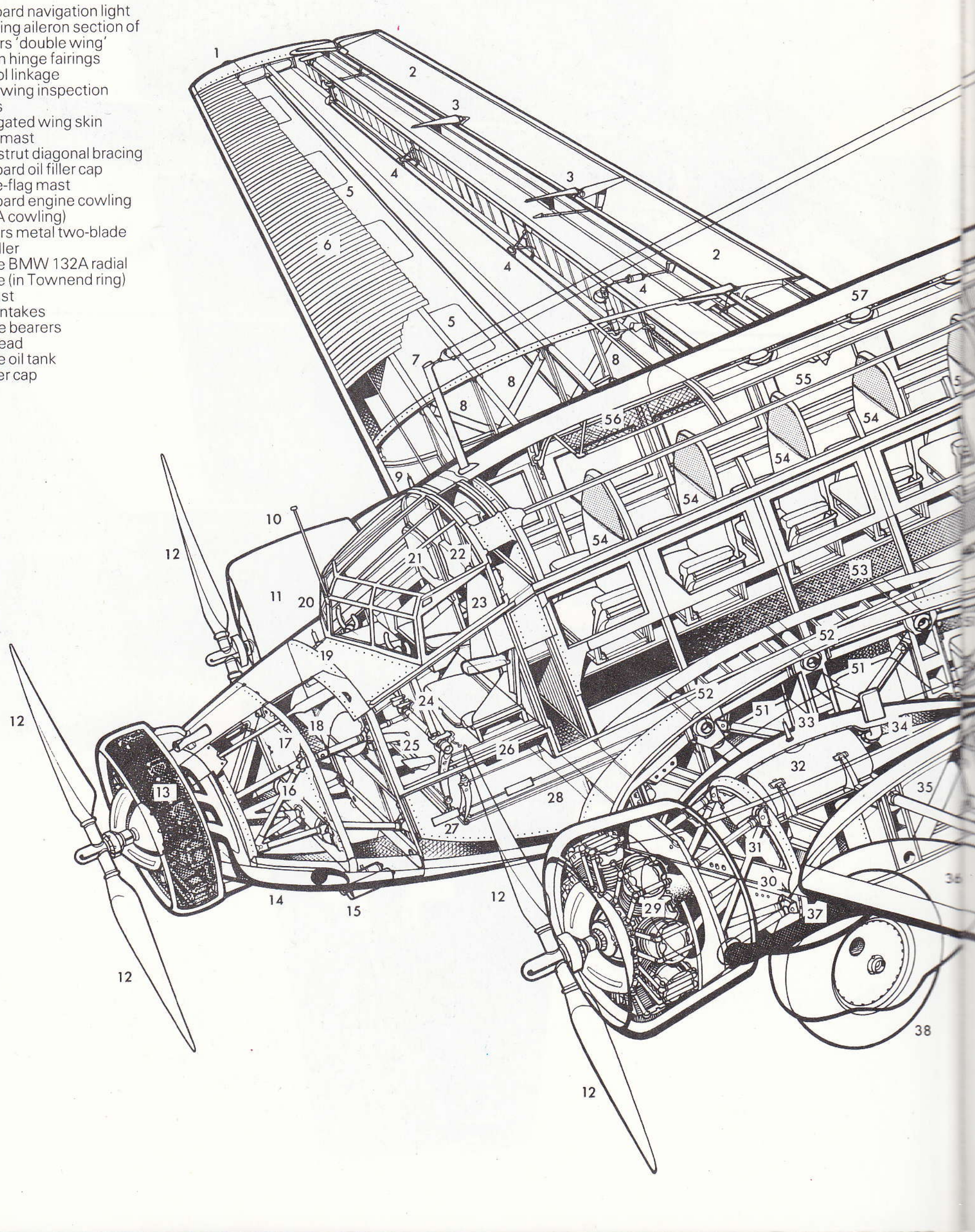
An important development of the Junkers design was the Ju 52/3m g7e with an autopilot and three 7.92-mm (0.31-in) defensive guns, wider cabin doors and accommodation for 18 fully-equipped troops, but plans to replace the 'Iron Annie' with the Ju 352 Herkules came to little, and the elderly tri-motor was still in action



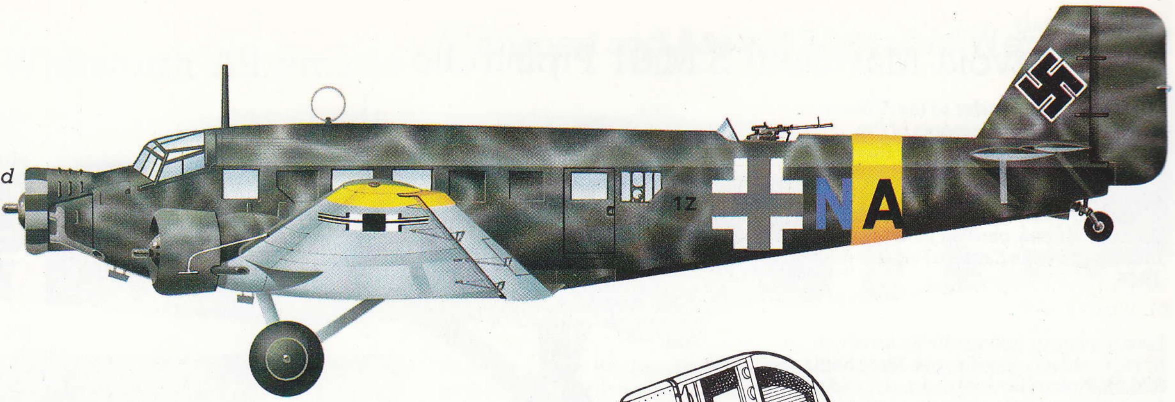
The red collar patch on this Feldwebel's uniform indicates that he is a parachute artilleryman. He and his fellow paratroopers are probably near Narvik during the operation to relieve German forces there in early 1940.

Junkers Ju 52/3m ge cutaway drawing key

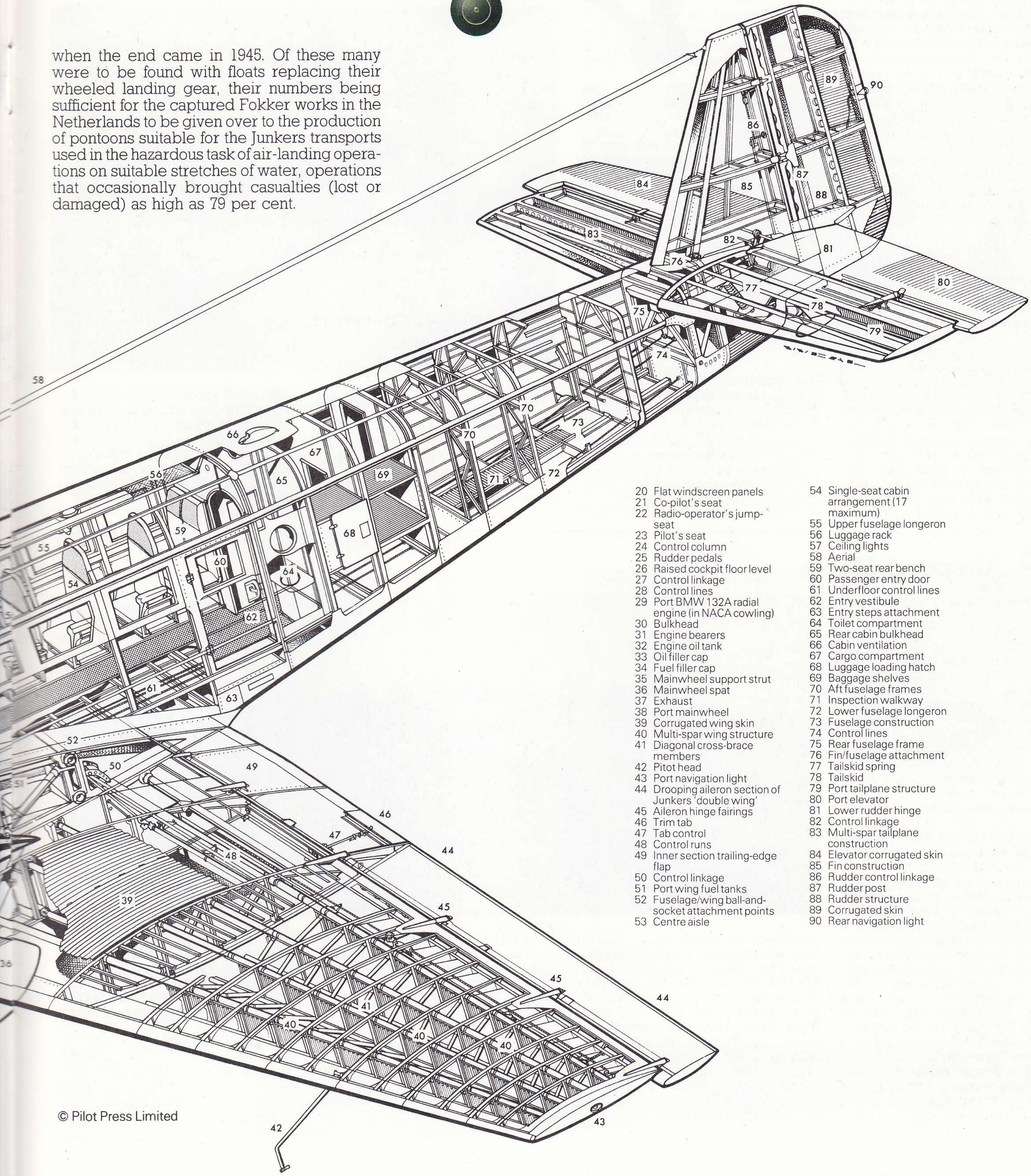
1 Starboard navigation light
2 Drooping aileron section of Junkers 'double wing'
3 Aileron hinge fairings
4 Control linkage
5 Underwing inspection panels
6 Corrugated wing skin
7 Aerial mast
8 Wing strut diagonal bracing
9 Starboard oil filler cap
10 House-flag mast
11 Starboard engine cowling (NACA cowling)
12 Junkers metal two-blade propeller
13 Centre BMW 132A radial engine (in Townend ring)
14 Exhaust
15 Filter intakes
16 Engine bearers
17 Bulkhead
18 Centre oil tank
19 Oil filler cap



Ju 52/3m g7e of Stab IV/TG 1 – formerly KGzbV 1 – in markings worn during the final winter of the war, in this instance on the Courland Front. In accordance with Hitler's orders, units of the Wehrmacht fought to the death when encircled by the Soviet armies, and Ju 52/3ms were frequently called upon to parachute supplies to the surrounded troops.



when the end came in 1945. Of these many were to be found with floats replacing their wheeled landing gear, their numbers being sufficient for the captured Fokker works in the Netherlands to be given over to the production of pontoons suitable for the Junkers transports used in the hazardous task of air-landing operations on suitable stretches of water, operations that occasionally brought casualties (lost or damaged) as high as 79 per cent.



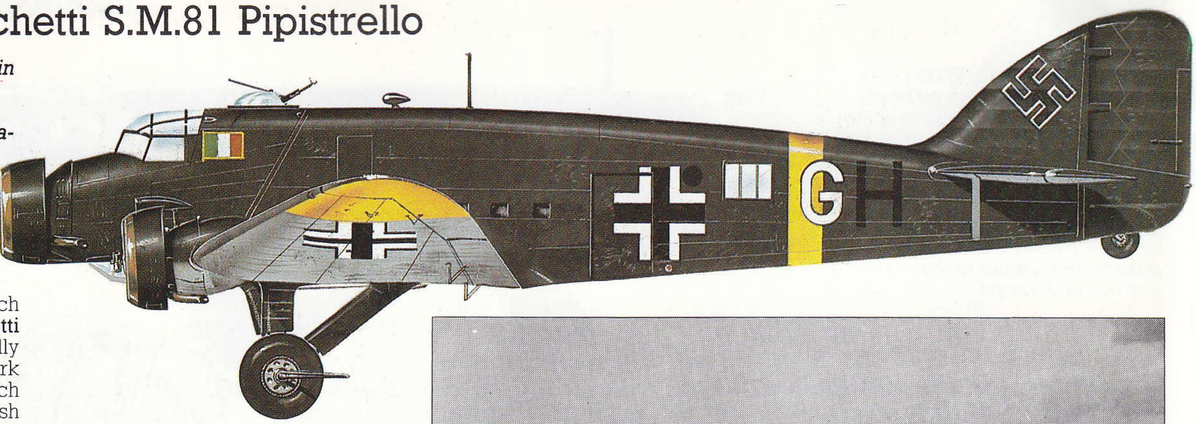
20 Flat windscreen panels
21 Co-pilot's seat
22 Radio-operator's jump-seat
23 Pilot's seat
24 Control column
25 Rudder pedals
26 Raised cockpit floor level
27 Control linkage
28 Control lines
29 Port BMW 132A radial engine (in NACA cowling)
30 Bulkhead
31 Engine bearers
32 Engine oil tank
33 Oil filler cap
34 Fuel filler cap
35 Mainwheel support strut
36 Mainwheel spat
37 Exhaust
38 Port mainwheel
39 Corrugated wing skin
40 Multi-spar wing structure
41 Diagonal cross-brace members
42 Pitot head
43 Port navigation light
44 Drooping aileron section of Junkers 'double wing'
45 Aileron hinge fairings
46 Trim tab
47 Tab control
48 Control runs
49 Inner section trailing-edge flap
50 Control linkage
51 Port wing fuel tanks
52 Fuselage/wing ball-and-socket attachment points
53 Centre aisle
54 Single-seat cabin arrangement (17 maximum)
55 Upper fuselage longeron
56 Luggage rack
57 Ceiling lights
58 Aerial
59 Two-seat rear bench
60 Passenger entry door
61 Underfloor control lines
62 Entry vestibule
63 Entry steps attachment
64 Toilet compartment
65 Rear cabin bulkhead
66 Cabin ventilation
67 Cargo compartment
68 Luggage loading hatch
69 Baggage shelves
70 Aft fuselage frames
71 Inspection walkway
72 Lower fuselage longeron
73 Fuselage construction
74 Control lines
75 Rear fuselage frame
76 Fin/fuselage attachment
77 Tailskid spring
78 Tailskid
79 Port tailplane structure
80 Port elevator
81 Lower rudder hinge
82 Control linkage
83 Multi-spar tailplane construction
84 Elevator corrugated skin
85 Fin construction
86 Rudder control linkage
87 Rudder post
88 Rudder structure
89 Corrugated skin
90 Rear navigation light

© Pilot Press Limited

ITALY

Savoia-Marchetti S.M.81 Pipistrello

After Italy's surrender to the Allies in September 1943, elements of the Italian air force continued to serve alongside the Luftwaffe. This Savoia-Marchetti S.M.81 of the Gruppo Trasporti 'Terraciano', Repubblica Sociale Italiana, carried Luftwaffe markings on the Eastern Front in 1944.



Like the larger Junkers Ju 52/3m which it resembled, the **Savoia-Marchetti S.M.81 Pipistrello** (bat) had originally been designed as a bomber, the work of Alessandro Marchetti, and as such had seen service in both the Spanish and Abyssinian wars; also like the German design it had its root in civil aviation, being based on the **S.M.73**, which also had a fixed landing gear arrangement.

Dating as it did from 1935, the S.M.81 was already suffering a degree of obsolescence when Italy entered World War II, so that despite the robust mixed construction which proved capable of absorbing much battle damage, it was rapidly replaced as a bomber by the S.M.79, production having ceased in March 1938 after 534 had been delivered; the 304 which remained on the strength of the Regia Aeronautica were converted to troop carriers (18 men) after withdrawal from front-line *squadriglie*.

In this capacity, the S.M.81 was relegated to service on the African and Eastern fronts, where it proved sufficiently useful for production to be resumed in 1943 of the version which by then had been designated **S.M.81/T.** However, the coming of the armistice with the Allies in September 1943 meant that only about 80 of these additional aircraft were built, and only four remained in the south by this time although no less than two complete transport units were still equipped with the type in the 'Saló' Republic of Italy (Fascist-controlled northern Italy). An interesting historical fact is that one transport model of the S.M.81 was later used as the personal transport of Mussolini, a specimen that received the inappropriate name *Taratuga* (tortoise).

A variety of different radial motors was fitted, including the 484.7-kW (650-hp) or 507.1-kW (680-hp) Alfa Romeo 125 RC.35 or 126 RC.34 respectively, the 484.7-kW (650-hp) Gnome-Rhône 14K or the 499.6-kW (670-hp) Piaggio P.X RC.35.

Specification

Savoia-Marchetti S.M.81/T

Type: troop transport

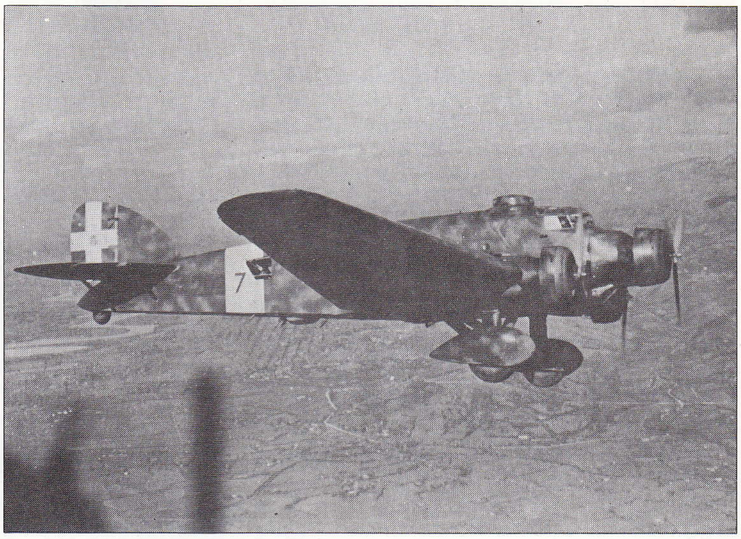
Powerplant: three 499.6-kW (670-hp) Piaggio P.X RC.35 9-cylinder air-cooled radial piston engines

Performance: maximum speed 340 km/h (211 mph) at 1000 m (3,281 ft); service ceiling 7000 m (22,966 m); range 2000 km (1,243 miles)

Weights: empty 5800 kg (12,787 lb); maximum take-off 10500 kg (23,149 lb)

Dimensions: span 24.00 m (78 ft 8.9 in); length 17.80 m (58 ft 4.8 in); height 4.45 m (14 ft 7.2 in); wing area 92.80 m^2 (998.9 sq ft)

Armament: five 7.7-mm (0.303-in) Breda-SAFAT machine-guns



The Italian Savoia-Marchetti S.M.81 'Pipistrello' served both as a bomber and a troop transport. In the latter role aircraft of the 37°Stormo took part in the 1939 invasion of Albania; dubbed Lumace *('slugs') on account of their very low speed, they also took part in the Axis evacuation of Tunisia in 1943.*

UK

Airspeed Horsa

It was December 1940 when the design staff of the Airspeed Company at London Colney received Specification X.26/40 calling for a type capable of taking 25 soldiers with their equipment in a glider with a wing span greater than that of a Wellington bomber. About 11 months later one of a pair of **Airspeed Horsa** prototypes was towed off from Fairey's Great West Aerodrome, later incorporated into London Airport, by an Armstrong Whitworth Whitley. Simultaneously, five more were being put together at Portsmouth to facilitate trial loading of military vehicles.

Two types of glider were evolved, the **Horsa Mk I** with a hinged door-ramp on the port side and towed by a 'Y' tow rope, and the **Horsa Mk II** with a single cable and a hinged nose to facilitate the loading of light guns etc.

Being made almost entirely of wood, the Horsa could be manufactured quite simply by the furniture industry, the well-known firm of Harris Lebus producing the majority, although the Austin Motor Company produced a quantity. The parent firm was responsible for a mere 700, the only Horsas built, assembled and tested on a single site. The overall total was 3,633.

One of the first uses of the Horsa was when 30 were towed in daylight to North Africa from the UK, and of this total only three were lost, one alone apparently to enemy action. A short time later the type received its baptism of fire during the invasion of Sicily: of 137 Waco Hadrian and Horsa gliders despatched, only 12 reached their correct landing zones, and 10 of these were Horsas. About a year later Horsas were in use during the D-Day invasion, and were employed in subsequent actions, including that at Arnhem when about 600 were operated.

On occasions such as these 20 men per aircraft were carried. The Horsa's capacity being greater than that of the Hadrian, many Horsas went for use by US forces, although these continued to be towed into action by British tugs. Wheels, although able to be jettisoned, were largely retained in action.

Runway scene in Britain in 1944 as Stirling Mk IVs start their take-offs with Horsa gliders in tow – resplendent in their black and white 'invasion stripes'. The Horsa Mk II had a hinged nose for ease of loading.

Specification

Airspeed Horsa Mk II

Type: troop and general transport glider

Performance: maximum towing speed 161 km/h (100 mph)

Weights: empty 3402 kg (7,500 lb); maximum take-off 6917 kg (15,250 lb)

Dimensions: span 26.82 m (88 ft 0 in); length 20.42 m (67 ft 0 in); height 6.40 m (21 ft 0 in); wing area 106.65 m^2 (1,148 sq ft)

UK

Armstrong Whitworth Albemarle

Originally a Bristol design for a reconnaissance bomber with Taurus motors, the **Armstrong Whitworth Albemarle** was transferred from its parent organization. When the prototype first flew on 20 March 1940 it was something of a pioneer in that not only did it incorporate composite steel and wood construction, which would have facilitated wide sub-contracting, but it also boasted a tricycle landing gear, an arrangement not hitherto used in the UK on a production design.

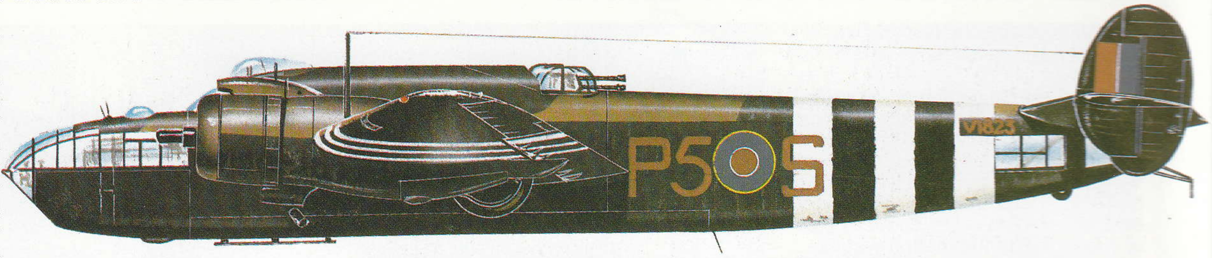
Delivery of the first examples was slow, not beginning until October 1941, the first 42 **Albemarle Mk I** aircraft alone being completed as bombers and subsequently converted, the remaining 558 Albemarles being produced as special transports and glider tugs. Manufacture was entirely subcontracted outside the aircraft industry, final assembly being undertaken at a plant set up at Gloucester by Hawker Siddeley with the name of A.W. Hawksley Ltd.

Before December 1944 when production ceased, a total of 247 had been delivered as tugs (**Albemarle Mk V** and **Albemarle Mk VI** for the most part), the first RAF squadron to receive the type being No. 295 in January 1943. It fell to another squadron, No. 297, to use the type first in action, when in July 1943 they towed gliders at the invasion of Sicily in company with those of No. 296.

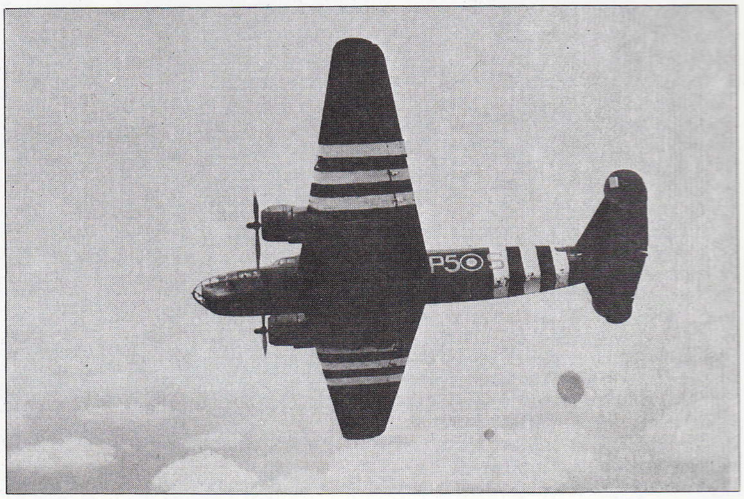
An example of the special transport role of the **Albemarle Mk II** and Albemarle Mk VI took place during the D-Day landings in June 1944: on this occasion six Albemarles acted as pathfinders dropping men of the 22nd Independent Parachute Company. However, the type acted chiefly as a glider tug, four Albemarle squadrons taking Airspeed Horsas to France, while in September two squadrons from No. 38 Group took the gliders of the 1st Airborne Division to Arnhem. But probably the most abiding memory of the type is the pall of smoke in which they taxied on return, caused by the overheating engines having to supply high power at low speed.

Specification
Armstrong Whitworth Albemarle Mk II

Type: glider-tug and special transport
Powerplant: two 1185.7-kW (1,590-hp) Bristol Hercules XI 14-cylinder radial air-cooled piston engines
Performance: maximum speed 412 km/h (256 mph) at 3200 m (10,500 ft); service ceiling 5486 m (18,000 ft); range 2173 km (1,350 miles)
Weights: empty 10251 kg (22,600 lb); maximum take-off 16556 kg (36,500 lb)
Dimensions: span 23.47 m (77 ft 0 in); length 18.26 m (59 ft 11 in); height 4.75 m (15 ft 7 in); wing area 74.65 m^2 (803.6 sq ft)
Armament: two 7.7-mm (0.303-in) manually-operated Vickers 'K' machine-guns



This Armstrong Whitworth Albemarle Mk V of No. 297 Squadron was employed in the invasion of Sicily in July 1943. A generally unpopular aircraft among both aircrew and passengers, it was unusual among British-designed wartime aircraft in being fitted with a tricycle landing gear.



The Albemarle, of largely wooden construction, having failed to find favour as a bomber, entered service as a transport with No. 295 Squadron, RAF, in January 1943 and, as a glider tug towing Horsas, took part in the landings in Sicily, Normandy and Arnhem.

UK

Armstrong Whitworth Whitley

The first glider-tug and paratroop trainer had been an **Armstrong Whitworth Whitley Mk II** used by No. 1 Parachute Training School at Ringway in the summer of 1940. The drops were made from a platform in place of the rear turret, although exit was later made via the ventral turret aperture, and the aircraft made a strange sight with its landing gear lowered to reduce speed on practice runs.

Initial use of the type in airborne action was when **Whitley Mk V** aircraft were used in the first British paratroop action, the abortive operation 'Colossus' of 10 February 1941 when an attempt was made to destroy the viaducts at Tragino, Campagna, which would have cut the supply of all water to southern Italy.

The second paratroop action involving the Whitley was that led by Wing Commander P.C. Pickering against Nazi radar installations at Bruneval on the night of 27/28 February 1942, the aircraft in this case being found by No. 51 Squadron.

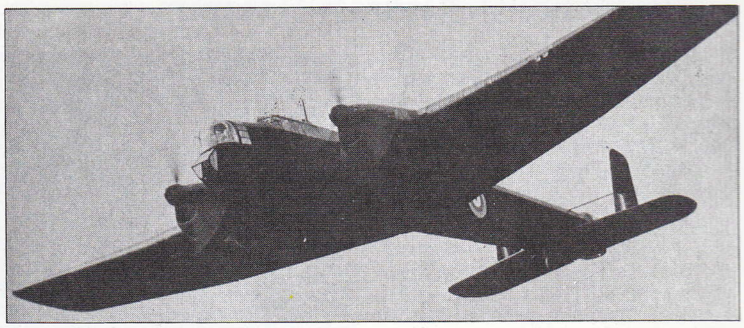
Used only for training was the Whitley glider-tug. For this use the aircraft had their rear turrets removed, leaving the position open, and Whitleys in this configuration were a common sight over the Oxfordshire countryside and elsewhere, the former being those which operated with Airspeed Horsas from Brize Norton with No. 21 Heavy Glider Conversion Unit.

In June 1943 the last Whitley from a total of 1,814 was delivered by the parent company, 1,466 being of the Whitley Mk V model distinguished by a 38.1-cm (15-in) increase to the fuselage length and straight leading edges to the fins.

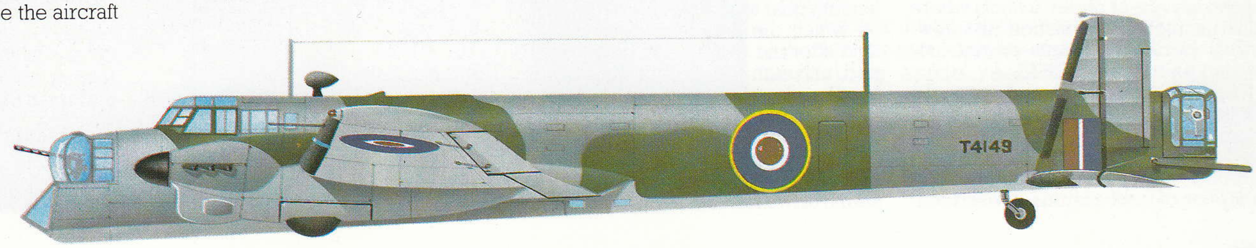
However, not all airborne versions were used for their intended role, it being on record that the summer of 1943 saw some tugs pressed into service to drop leaflets over the Low Countries after a flight from Thruxton!

Specification
Armstrong Whitworth Whitley Mk V

Type: glider-tug trainer and paratroop transport
Powerplant: two 853.8-kW (1,145-hp) Rolls-Royce Merlin X 12-cylinder Vee liquid-cooled piston engines
Performance: maximum speed 357 km/h (222 mph) at 5182 m (17,000 ft); service ceiling 5364 m (17,600 ft); range 2655 km (1,650 miles)
Weights: empty 8768 kg (19,330 lb); maximum take-off 15195 kg (33,500 lb)
Dimensions: span 25.60 m (84 ft 0 in); length 21.49 m (70 ft 6 in); height 4.57 m (15 ft 0 in); wing 114.45 m^2 (1,232 sq ft)
Armament: (as bomber) four 7.7-mm (0.303-in) Browning machine-guns in a power operated rear turret, and one 7.7-mm machine-gun in a nose turret



The venerable Whitley, veteran of early wartime bombing missions, was employed from 1941 as a troop transport. In Operation 'Biting', the airborne landing at Bruneval on 27 February 1942, 12 Whitleys from Thruxton dropped 119 paratroops round the German radar station.



Although Whitleys were not used operationally as glider tugs, many were converted to tow Horsas with No. 21 Heavy Glider Conversion Unit at Brize Norton in 1943.

UK

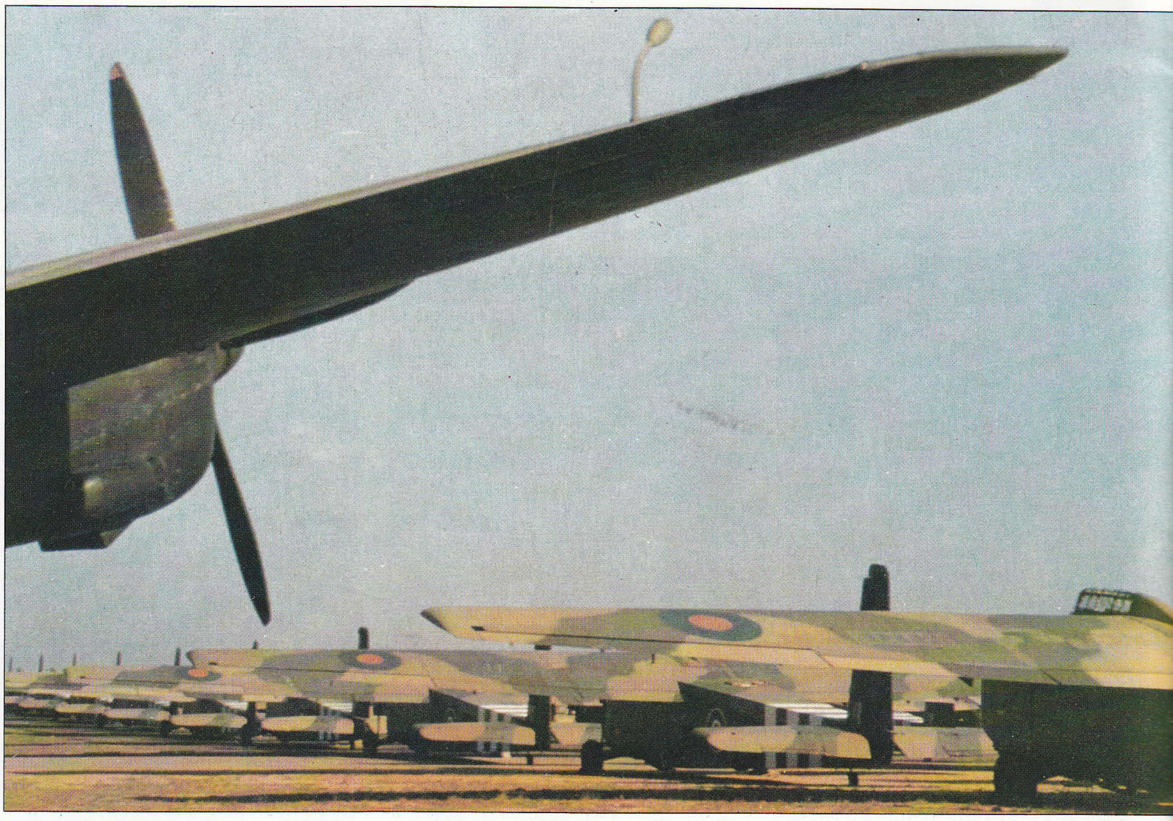
General Aircraft Hamilcar

The **General Aircraft Hamilcar** was the largest and heaviest glider used by the RAF, and the first capable of accommodating a 7-ton tank. A total of 412 of the **Hamilcar Mk I** was built after the first flight of the prototype on 27 March 1942, all the tests being completed within three weeks. This may in part have been due to the previous construction of a half-scale model for tests at one-eighth of the loaded weight.

To facilitate the loading and rapid unloading of heavy equipment, the nose was hinged, this enabling vehicles to be driven straight out immediately on landing. This feature proved invaluable at the first use of the type in support of the 6th Airborne Division in Normandy at the beginning of June 1944, when tugs were supplied by units flying the Handley Page Halifax, 70 being used in the first action.

With an eye to re-use on the return journey as well as improving take-off from indifferent airfields, the powered **Hamilcar Mk X** was evolved primarily for the proposed invasion of Japan. The powerplant for this variant consisted of two 719.6-kW (965-hp) Bristol Mercury 31 radials with simplified controls including a single-lever engine operation, no cooling gills, fixed-pitch wooden propellers, and hydraulic hand-pumps to restore the 'sinking undercarriage' (designed to ease loading) to its original position. Single-point towing was used for the Hamilcar Mk X instead of the bifurcated system of the pure glider Hamilcar Mk I. The type was quite capable of being used alternatively as a solo aeroplane with a loaded weight not exceeding 14742 kg (32,500 lb). Maximum speed and range were 233 km/h (145 mph) and 1135 km (705 miles) respectively.

It is interesting to note the fact that the military load of the Hamilcar Mk I consisted of some 50 per cent of the all-up weight compared with 30 per cent in the Hamilcar Mk X.



Seen beneath the wing of a Halifax is a line-up of British Hamilcar assault heavy gliders at the time of the Normandy landings. The only Allied aircraft capable of delivering a light tank into battle, the Hamilcar could carry a Tetrarch or Locust.

Specification

General Aircraft Hamilcar Mk I

Type: transport glider

Performance: maximum towing speed 241 km/h (150 mph)

Weights: empty 8845 kg (19,500 lb); maximum take-off 16783 kg (37,000 lb)

Dimensions: span 33.53 m (110 ft 0 in); length 20.73 m (68 ft 0 in); height 6.17 m (20 ft 3 in); wing area 154.03 m^2 (1,658 sq ft)

UK

General Aircraft Hotspur

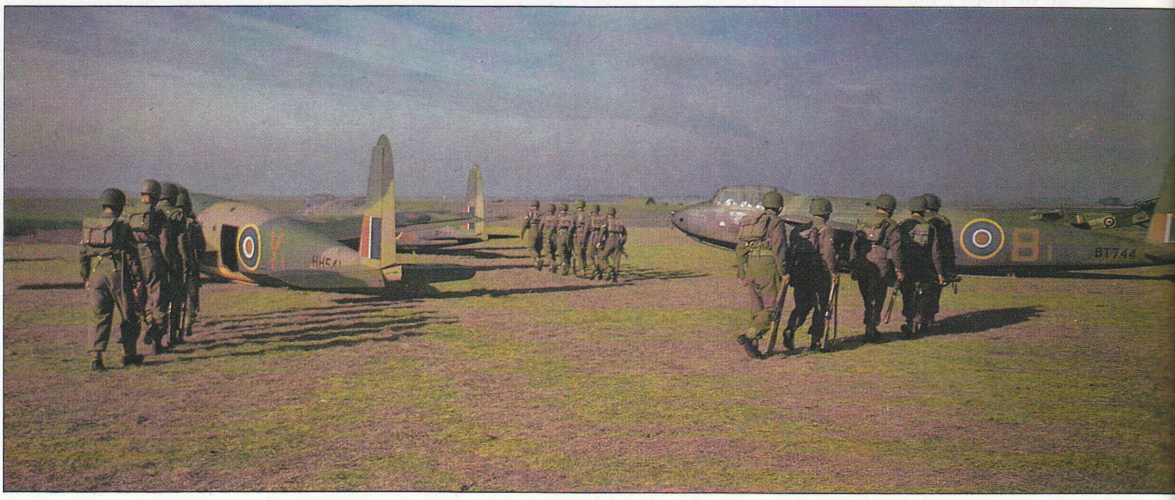
Toward the end of 1940 a British specification was issued for an assault glider capable of flying 161 km (100 miles) from its point of release at 6096 m (20,000 ft), and the **General Aircraft Hotspur Mk I** was the result. In fact it could glide only 134 km (83 miles), but this was quite an achievement since the original demand, that this be done with a load of seven fully equipped troops and a pilot, was really too stringent.

The Hotspur Mk I had a span of 18.90 m (62 ft 0 in) and was distinguishable from the later models by having cabin portholes. Despite the fact that 23 examples were built, the type was not accepted for widespread operational use, being developed instead into the **Hotspur Mk II** training glider whose simple wooden construction lent itself admirably to large-scale subcontracted manufacture.

Although never used for its intended purpose, the Hotspur was nevertheless built in numbers and performed useful service at glider schools where dual instruction was carried out following a period on single-engine powered aircraft at an EFTS.

Apart from the reduced span, the Hotspur Mk II differed in some detail from the earlier Hotspur Mk I, which had proved difficult to handle on the ground. The changes included the adoption of inset ailerons, revised seating and a deeper cockpit canopy, although it retained the jettisonable landing gear legs (and the central skid on which the type was designed to land after the wheels had been dropped, although this facility was seldom used).

The monocoque structure of the glider naturally lent itself to quite a high degree of adaptation, and a further variant was the **Twin Hotspur**, consisting of two fuselages with outer wing panels joined by a common centre section and tailplane; although a prototype was built in 1942 this version did not go into production.



The Hotspur was a familiar sight throughout Britain during the war years. Capable of being towed by redundant biplanes, most members of the British airborne forces and their pilots were introduced to gliders in these all-wooden craft.

Specification

General Aircraft Hotspur Mk II

Type: training glider

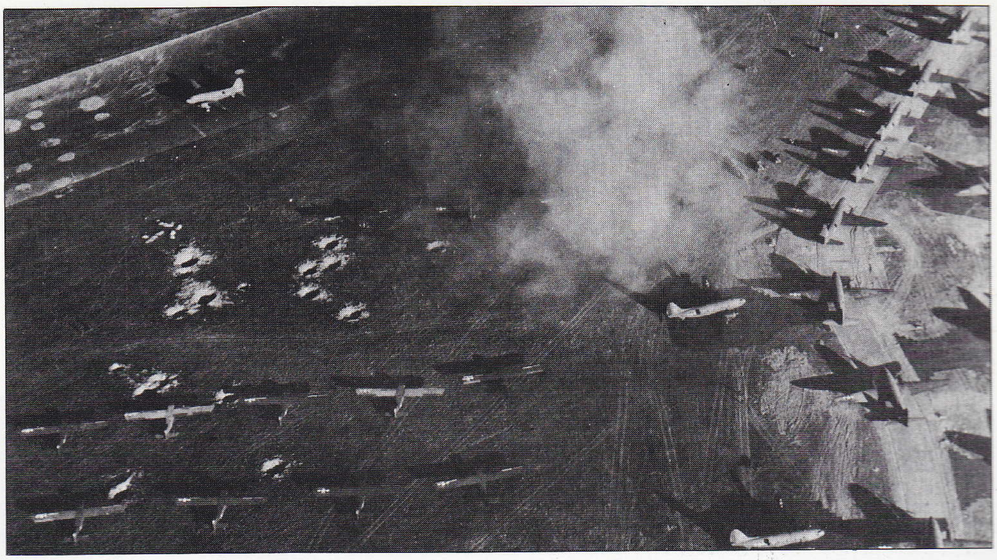
Performance: maximum towing speed 145 km/h (90 mph)

Weights: empty 753 kg (1,661 lb); maximum take-off 1632 kg (3,598 lb)

Dimensions: span 13.99 m (45 ft 10.75 in); length 12.11 m (39 ft 8.75 in); height 3.30 m (10 ft 10 in); wing area 25.27 m^2 (272 sq ft)

Arnhem

Arguably Montgomery's most costly failure, the airborne component of Operation 'Market Garden' was the largest single air assault operation that had ever been attempted.



Curtiss C-46 Commando transports of the 437th Troop Carrier Group, 53rd TC Wing, are seen at Ramsbury in the UK, belonging to Major-General Paul L. Williams' US IX Troop Carrier Command. Seen here with Waco Hadrian gliders on 17 September 1944, the command flew numerous towing and support missions over Arnhem and Nijmegen during the following week. Note the bomb craters.

During the morning of Sunday, 17 September 1944, the inhabitants of south east England witnessed the assembly in the skies above them of the greatest airborne armada of all time. From 22 airfields stretching from Dorset to Lincolnshire over 1,500 aircraft climbed into the air, and as the fighter and bomber units sped away on their protection or distraction tasks Douglas C-47 Dakota transports and Short Stirling bombers converted for troop-carrying, some of them towing a total of 478 gliders packed with men or vehicles, formed up for their journeys over the North Sea to the Netherlands.

One stream made for the North Foreland, then due east across the sea to Geel, then north towards their dropping zone at Eindhoven; these held the men and equipment of the US 101st Airborne Division (commanded by Major-General James Gavin). The second, larger stream, flew on a line farther north, over Aldeburgh and then Shouen Island, above the specially positioned vessels in the North Sea flashing their beacon lights, over the Dutch coast as far as the oddly named small town of s'Hertogenbosch where the stream split into two. The larger part carried the US 82nd Airborne Division and flew almost due east towards the area between Grave and Nijmegen, while the smaller part carried the Air Landing Brigade and one Parachute Brigade of the British 1st Airborne Division (commanded by Major-General Robert Urquhart) and flew north east to the divison's landing grounds 16 km (10 miles) to the west of the town of Arnhem and its vital bridge over the Neder Rijn.

That bridge and four other bridges to the south at Nijmegen, Grave, Veghel and Eindhoven, were the objectives for these airborne forces, for farther to the south (along the line of the Meuse-Escaut Canal) waited the forward troops of the British 2nd Army, poised to hurl themselves forward along the Eindhoven-Arnhem road and across all the canals and rivers between, outflanking the main German defences of the Siegfried Line and thus forming, in the words of their commander-in-chief, Field Marshal Sir Bernard Montgomery, 'a springboard for a powerful full-blooded thrust to the heart of Germany'.

The bridge at Arnhem was the tip of that springboard, the *Ultima Thule* of Operation 'Market Garden'.

Twelve converted British bombers and six American Dakotas carried the Pathfinder company that dropped first, and within its time schedule the company's work was completed; as the 149 Dakotas carrying the men of 1st Parachute Brigade arrived over Dropping Zone X the flares were all burning and the marking tapes laid out, as they were for Landing Zones S and Z where the 254 Airspeed Horsa and 38 giant General Aircraft Hamilcar gliders of the Air Landing Brigade and Urquhart's headquarters were released from their tows, first to drop with stomach-wrenching acceleration then to level off and skim silently to their destinations. From the entire force only five gliders had been hit or the tows cut during the journeys, and only 35 aircraft lost – many of these after they had dropped their parachutists or slipped their tows. As a loss rate of 30 per cent had been predicted, the omens looked good at first for 'Market Garden'.

Nevertheless, the first troop movements were slow to begin. It was 15.30 on that fine Sunday afternoon before Lieutenant-Colonel John Frost had assembled the men of his 2nd Parachute Battalion and led them off on their 13-km (8-mile) march to the Arnhem Bridge. But their planned predecessors, the brigade reconnaissance squadron which should have raced off long before in their armed Jeeps to take the bridge by *coup de main*, had not even started; by an unfortunate coincidence three of the gliders which had been lost had been carrying their vehicles.

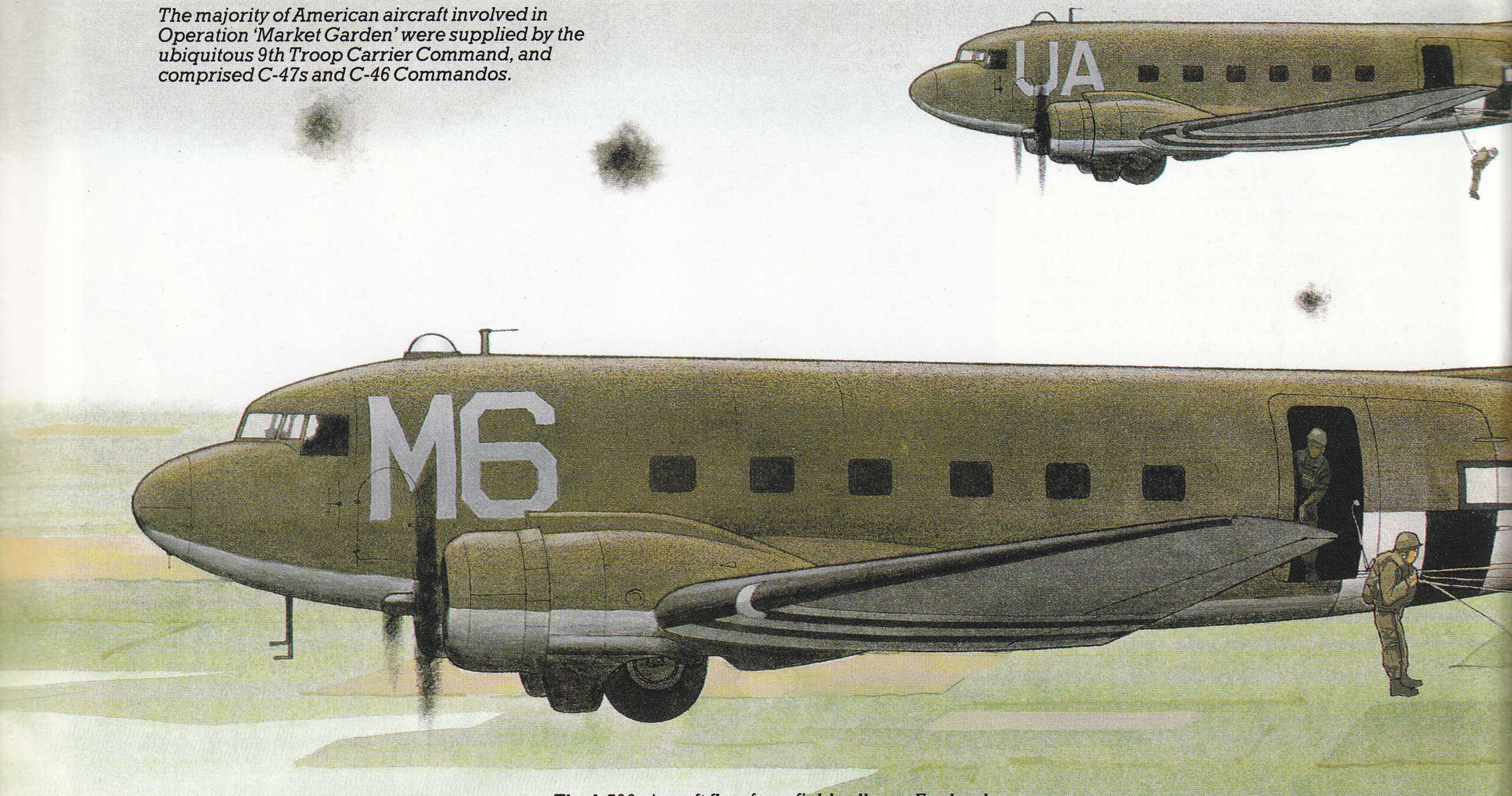
The race to the bridge

Frost's battalion reached Oosterbeek, a small town half way to Arnhem, and Frost was about to detach one company to capture and cross the railway bridge over the Neder Rijn (to storm the southern end of the main bridge while the rest of the battalion took the northern end) when a loud explosion revealed that they were too late and that the rail bridge had been blown.

This was the second serious setback, but the British paratroops pressed on after first brushing aside resistance by German armoured cars and snipers inside Oosterbeek town; but it was dark by the time Frost and his men reached Arnhem Bridge, and began the epic battle by which the legend of '2nd Para' was born.

The lightly equipped parachute divisions were seriously outmatched when German resistance unexpectedly included crack Panzer units. Anti-tank weaponry on the perimeter often meant PIAT infantry weapons only.

The majority of American aircraft involved in Operation 'Market Garden' were supplied by the ubiquitous 9th Troop Carrier Command, and comprised C-47s and C-46 Commandos.



The 1,500 aircraft flew from fields all over England to the landing zones in the Netherlands, dropping American troops around Nijmegen and Eindhoven and the British 1st Airborne Division near Arnhem.

Meanwhile, Urquhart was facing another severe difficulty: his signal sets were not working. This was not so uncommon in those pre-transistor days, and in fact it is fair to say that in 1944 no satisfactory small portable set had yet been manufactured; they were either too heavy for easy transport or too fragile and short in range for effectiveness in a spreading battle. So in order to find out what was happening, Urquhart set out after his paratroops by Jeep.

He found Frost's HQ close to the Rhine bank, then turned back and towards the sound of battle near Oosterbeek. There Urquhart found Lieutenant-Colonel Fitch's 3rd Battalion (heavily engaged with young German troops who had been rushed down to block them and who fought with fanatical zeal) and also found the commander of 1st Parachute Brigade, Brigadier Lathbury. By now it was dark, it was evident that German Panzer units were coming into position between 3rd Battalion and Arnhem, as they were also between Lieutenant-Colonel Dobie's 1st Parachute Battalion working its way along the railway line running into Arnhem from the west.

The night was spent by 1st and 3rd Battalions probing down towards Arnhem against ever-thickening resistance, and by Frost's men first attempting to cross the bridge to the southern end against withering fire from armoured vehicles and a pill-box, then repelling the first efforts by German vehicles to cross from the south. Four German lorries were set on fire, and in their light Frost's engineers cut all the leads they could find, though heat and machine-gun fire prevented them from reaching German demolition charges set among the girders.

But by now the pattern of the battle had been formed; powerful and efficient German units were being fed into the gap between Frost's men at the bridge and all possible reinforcements - and even when the 4th Parachute Brigade under Brigadier John Hackett arrived on the Monday afternoon, it could only fight its way forward to join the remnants of 1st and 3rd Battalions, blocked around Oosterbeek and the small farms and houses to the west. Throughout the next two days the separate battles raged with ever-increasing ferocity, the advantage moving to the Germans as a result of dwindling numbers on the British side (and dwindling ammunition too, for to the near-despair of the men fighting in constricting areas, the RAF's supply aircraft were dropping the vital canisters in zones already occupied by the enemy).

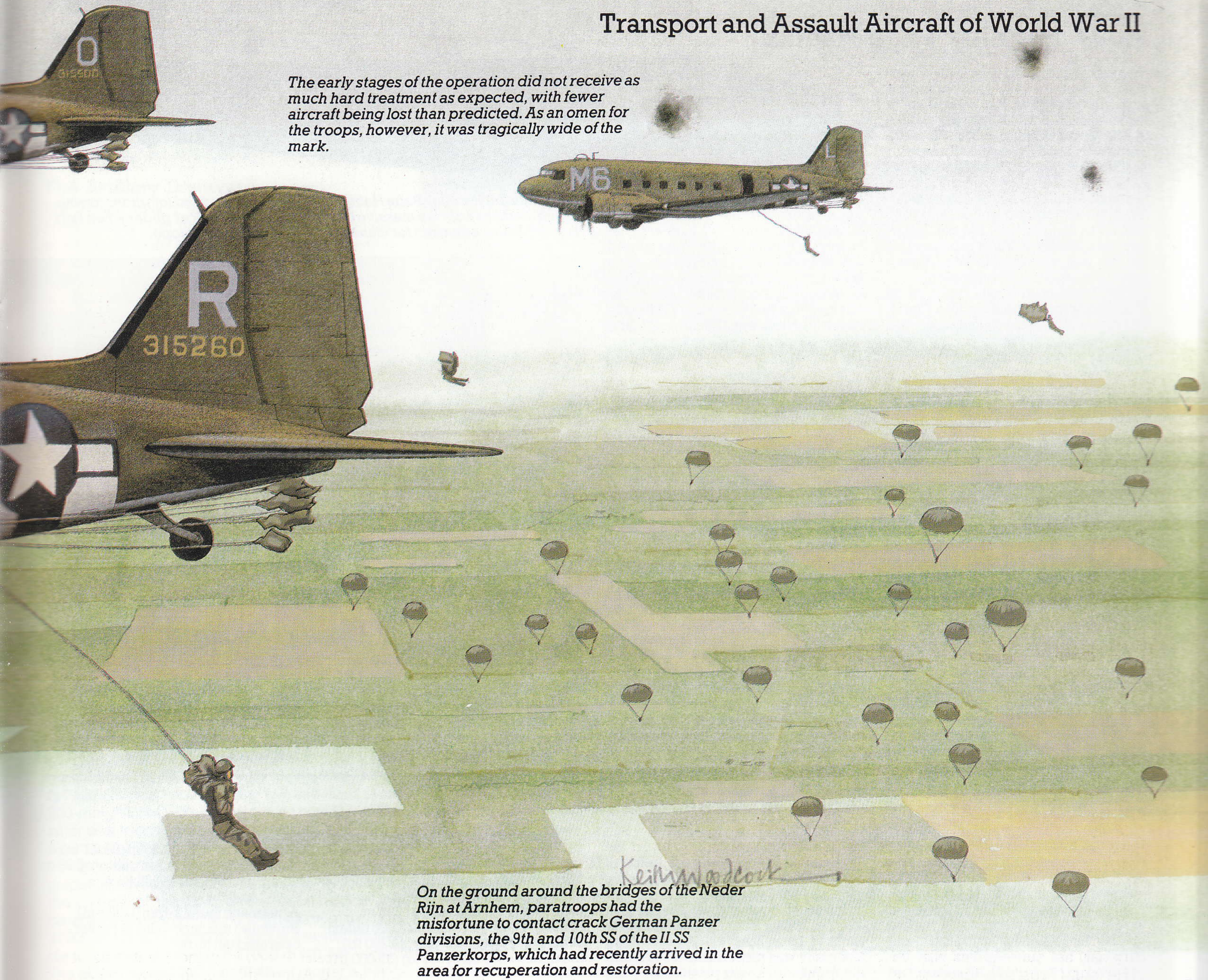
By Wednesday night it was all over at the bridge. Frost had been wounded during the late afternoon, the Germans had shelled into chaos every building the paratroops had occupied, and now their Panzers moved inexorably across the bridge; German infantry closed in and took the few fit survivors prisoner, carrying away and treating the wounded with care and courtesy.

During Thursday, the survivors of the division, now some 3,000 men, began coalescing around the village of Westerbouwing on the outskirts of Oosterbeek, their focal point St Elisabeth's Hospital, their outposts stretching down to the river bank, all their hopes resting in the promised arrival of the infantry and tanks of the 2nd Army. But alas, these were baulked at Nijmegen by fierce German defences, now further reinforced as more Panzer formations drove down across the Arnhem bridge.

Spirits were raised briefly on the afternoon of Friday, 22 September, when the Polish Airborne Brigade under its gallant General Sosabowski was dropped just south of the river, but the ferries had been destroyed and every attempt by the Poles to go to the rescue of the British came under withering fire from both banks; in the end only about 50 Poles got across. And the ordeal of the 1st Airborne Division had still another three days to run.

The men had been told that they would be relieved certainly within four days, perhaps in two; in the event they were on their own for nine days. Three battalions of the 43rd Division at last reached the southern bank of the river on Sunday afternoon, and some men of the 5th Dorsets crossed to bring help and reassurance to the exhausted, famished, desperate paratroops still holding on, and during the following afternoon their evacuation was organized.

That night XXX Corps artillery put down a devastating curtain of fire all around the perimeter, the glider pilots of the Air Landing Brigade taped out an escape route, and when



The early stages of the operation did not receive as much hard treatment as expected, with fewer aircraft being lost than predicted. As an omen for the troops, however, it was tragically wide of the mark.

On the ground around the bridges of the Neder Rijn at Arnhem, paratroops had the misfortune to contact crack German Panzer divisions, the 9th and 10th SS of the II SS Panzerkorps, which had recently arrived in the area for recuperation and restoration.

darkness had fallen, guided their dazed and staggering comrades down to the bank, where British and Canadian engineers waited in assault boats which had somehow been rushed up from Nijmegen.

And as one semi-conscious paratrooper stumbled out of his boat, into the welcoming arms of more XXX Corps infantry, he was heard repeating endlessly to himself 'That's bloody that! That's bloody that! That's bloody that!.

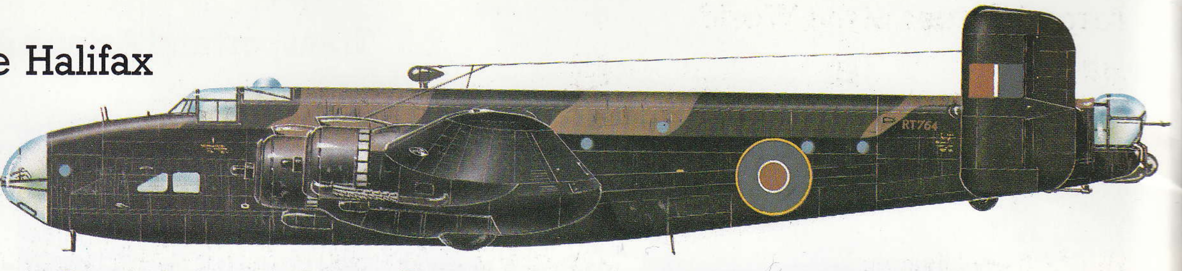
Operation 'Market Garden' had been a good idea. It was defeated by lack of information of enemy dispositions around Arnhem, by bad luck with weather which had contributed to XXX Corps' delay, and mistaken planning which had dropped 1st Airborne Division too far from its objective.

But the battle for Arnhem Bridge will live in history as long as the red beret is worn.

British paratroops are seen at Oosterbeek, near Arnhem. British and American aircraft dropped a total of 8,905 airborne soldiers and 1,100 glider pilots at Arnhem, of whom 2,163 escaped death or capture; of the 2,000 men of the 4th Parachute Brigade, only nine officers and 260 other ranks regained the British lines.

UK

Handley Page Halifax



The powerful Handley Page Halifax was the only type used for glider towing which could handle the massive General Aircraft Hamilcar glider when fully loaded. It was also used for clandestine missions over Europe.

Another bomber used for both glider-towing and the dropping of paratroops was the **Handley Page Halifax**, of which the **Halifax A.Mk III, Halifax A.Mk V** and **Halifax A.Mk VII** were commonly used throughout Europe for this work. Indeed, the Halifax was the only type capable of towing the giant General Aircraft Hamilcar glider when the latter was loaded with its light tank, while the final version, the paratroop-carrying **Halifax A.Mk 9** produced after the war, was able to take 16 men with their associated equipment.

The first experimental flights of an airborne forces' Halifax with a Hamilcar glider took place in February 1942 at Newmarket, although the first operational sortie, which was carried out nine months later on the night of 19/20 November, was conducted with two Airspeed Horsas. This was Operation 'Freshman', which took men to attack the German-run heavy water plant in southern Norway. Halifaxes also towed two Horsas apiece to North Africa for the invasion of Sicily, Operation 'Husky' launched on 10 July 1943.

Operation 'Elaborate' mounted over a period between August and October 1943 was intended to bring reinforcements to this theatre, and 10 Halifaxes plus Armstrong Whitworth Albemarles were used to take 25 Horsas. Unfortunately five of the gliders fell into the sea on the Portreath to Sale leg of the journey, either due to bad weather or enemy action, while three force-landed in Portugal, together with their Halifax tugs; another had to put down in the sea, where it was lost.

Other operations with which the Halifax is associated were, of course, that at Arnhem and the final crossing of the Rhine. In the latter the German forces were on the defensive on 24 March 1945, when 440 tugs were involved with an equal number of gliders, both Hamilcars and Horsas, all the troops in the former having emplaned at Woodbridge. Almost half of this force of tugs was made up of Halifaxes, there being an equal number of Short Stirlings and only a small number of Douglas Dakotas.

Specification
Handley Page Halifax A.Mk III

Type: glider tug and paratroop transport
Powerplant: four 1204.3-kW (1,615-hp) Bristol Hercules XVI 14-cylinder air-cooled radial piston engines
Performance: maximum speed 454 km/h (282 mph) at 4115 m (13,500 ft); service ceiling 6096 m (20,000 ft); range 1733 km (1,077 miles)
Weights: empty 14969 kg (33,000 lb); maximum take-off 24675 kg (54,400 lb)
Dimensions: span 30.12 m (98 ft 10 in); length 21.82 m (71 ft 7 in); height 6.32 m (20 ft 9 in) wing area 116.13 m^2 (1,250 sq ft)
Armament: one Vickers 'K' 7.7-mm (0.303-in) manually-operated machine-gun in nose, four 7.7-mm Browning machine-guns in power-operated Boulton Paul dorsal turret, and four guns of similar calibre in tail turret (if fitted)

The Halifax, apart from giving excellent service as a heavy bomber, proved adaptable as a glider-tug and transport during the war, equipping a total of 13 RAF squadrons. The Mk VIII version, shown here with a large ventral freight pannier, entered service with three squadrons shortly after the war's end.

UK

Short Stirling

From the beginning of 1944 the main role of the **Short Stirling**, designed as a bomber, was that of glider tug and transport operating with No. 38 Group, Transport Command. The prototype of the **Stirling Mk IV**, a converted Stirling Mk III, had first flown in 1943, and although the powerplant was unchanged, considerable alteration had taken place in the armament with the nose and dorsal turrets deleted (the former being replaced by a transparent fairing), and glider towing gear was installed in the rear fuselage, which retained the defensive turret in this position.

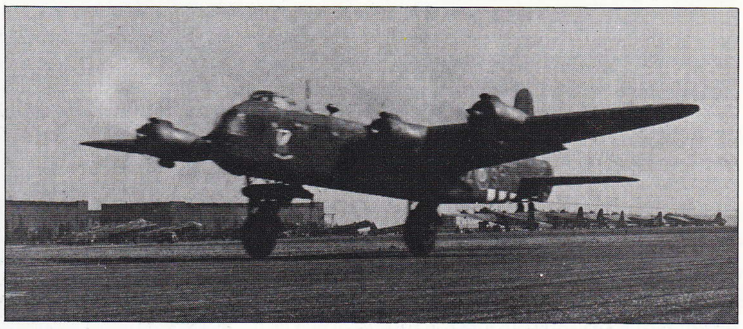
The capacious fuselage meant that the troop-carrying version was capable of taking either 40 fully-equipped soldiers or half that number of paratroops, but the first use of the Stirling in its new role was towing Airspeed Horsa gliders into action when the continent of Europe was invaded on 6 June 1944, the aircraft being drawn from Nos 190 and 622 Squadrons at Fairford and Nos 196 and 299 Squadrons at Keevil. The type also participated in the historic action at Arnhem and in the final assault across the river Rhine in March 1945.

Production was dispersed among a number of contractors, the largest number (236) coming from Short & Harland at Belfast; the Austin Motor Company was responsible for 198, and the remainder being produced by the company's Rochester works. In all 577 Stirling Mk IVs were delivered, although not all had originated in this form, a number being converted Stirling Mk IIIs.

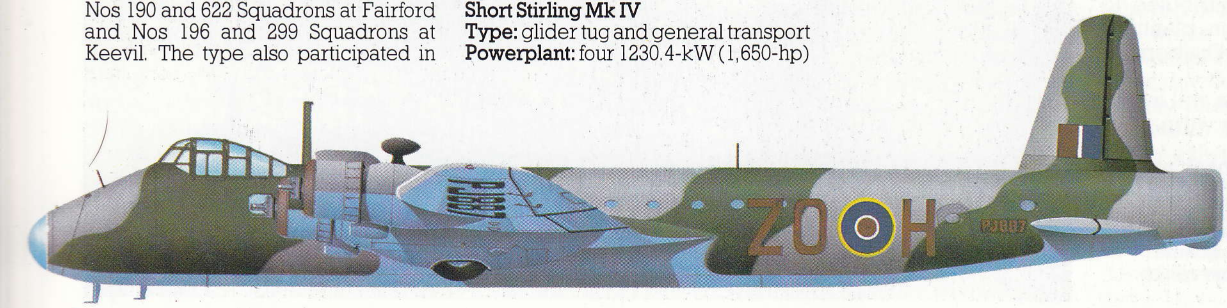
Another task performed by this version of the Stirling was the paradropping of supplies to parachute troops in forward areas, as well as the delivery of food and ammunition to Resistance workers on the continent. The type was also used to ferry petrol, a capacity load consisting of 2841.25 litres (625 Imp gal) in 139 cans.

Specification
Short Stirling Mk IV

Type: glider tug and general transport
Powerplant: four 1230.4-kW (1,650-hp) Bristol Hercules XVI 14-cylinder air-cooled radial piston engines
Performance: maximum speed 451 km/h (280 mph) at 3200 m (10,500 ft); service ceiling 5182 m (17,000 ft); range 4828 km (3,000 miles)
Weights: empty 19595 kg (43,200 lb); maximum take-off 31751 kg (70,000 lb)
Dimensions: span 30.20 m (99 ft 1 in); length 26.59 m (87 ft 3 in); height 6.93 m (22 ft 9 in); wing area 135.63 m^2 (1,460 sq ft)
Armament: four 7.7-mm (0.303-in) Browning machine-guns in power-operated tail turret



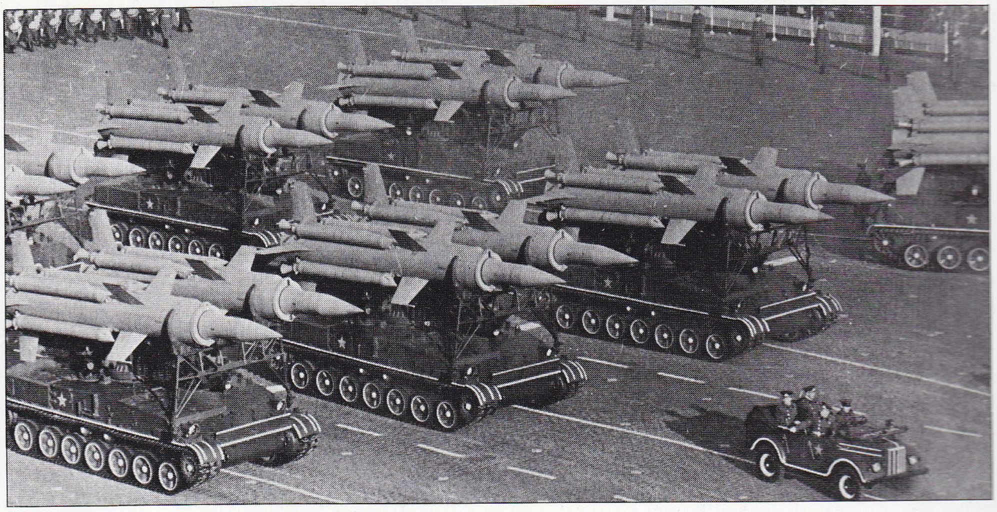
Above: Formerly heavy bombers, Short Stirling glider tugs were employed in all the major airborne operations over Northern Europe in 1944-5. The Stirling Mk IV, seen here taking off with a Horsa glider at Harwell, Oxfordshire, belonged to No. 295 squadron.



Converted to carry 40 troops, the Stirling Mk V transport entered service with No. 46 Squadron, RAF Transport Command, in February 1945 but was too late to see combat.

Soviet Army

Part 3



The SA-4 'Ganef' is seen here parading through Moscow on 7 November 1966. SA-4 batteries provide medium- to high-altitude anti-aircraft protection for Soviet army forces. Deployed up to 25 km (15.5 miles) behind the front, SA-4 has a range of 75 km (46.6 miles) and can destroy aircraft flying at 24000 m (78,740 ft).

The Artillery Division

The Soviet artillery division is normally found at Front or army level, and provides additional firepower for the divisions as and when required, for example during a breakthrough or in overcoming particularly strong static defences. The artillery division consists of an HQ, two artillery regiments with 130-mm (5.12-in) M-46 towed field guns, two artillery regiments with 152-mm (6-in) D-20 towed gun/howitzers, an anti-tank regiment with 36 100-mm (3.9-in) T-12 or T-12A towed anti-tank guns and 27 BRDM-2 4×4 vehicles with 'Sagger' or 'Spandrel' anti-tank guided missiles, a multiple rocket-launcher brigade with four battalions each of 18 BM-27 multiple rocket-launchers, a target-acquisition battalion, a signal company, a motor transport company and the usual services.

Each of the artillery regiments has three battalions each with 18 weapons, so giving the artillery regiment a total of 54 weapons. More recently the towed 152-mm (6-in) D-20 has started to be replaced by a 152-mm self-propelled gun/howitzer designated 2S3 (or M1973 as it is known sometimes in the West). The ordnance of the 2S3 is based on that of the towed D-20 and has a similar range, but as it is on a tracked chassis it has much greater mobility.

In addition to the artillery divisions there are also a number of heavy artillery brigades that are also deployed at Front level. These appear to be used to provide a massive amount of firepower mainly against heavy defensive positions. Each heavy artillery brigade is believed to have an HQ, a target-acquisition battery, two battalions of towed 240-mm (9.45-in) M1953 heavy mortars that are known to have a nuclear capability, and two battalions of old 203-mm (8-in) M1931 (B-4M) towed howitzers. The latter take a long time to bring into action and have a slow rate of fire by modern standards, so are now being replaced by a new 203-mm (8-in) self-propelled howitzer which is believed to be based on the chassis of the GMZ armoured minelayer and capable of firing an HE round to a maximum range of 27000 m (29,530 yards) or a rocket-assisted projectile to a maximum range of 37000 m (40,465 yards). The elderly towed 240-mm (9.45-in) mortar is being replaced by a new self-propelled model based on the chassis of the 152-mm (6-in) 2S3 and capable of firing one round per minute.

'Scaleboard' missile brigade

Also deployed at Front level is a surface-to-surface missile brigade with SS-22 'Scaleboard' missiles. This brigade has an HQ battery, three 'Scaleboard' battalions, a signal company, an engineer company and supporting services. Each 'Scaleboard' battalion has two batteries each with two 'Scaleboard' transporter/erector/launcher vehicles (TELs). An SS-23 'Scud' brigade also has 12 launchers, although some brigades in the Group of Soviet Forces in Germany (GSFG) each have 18 TELs.

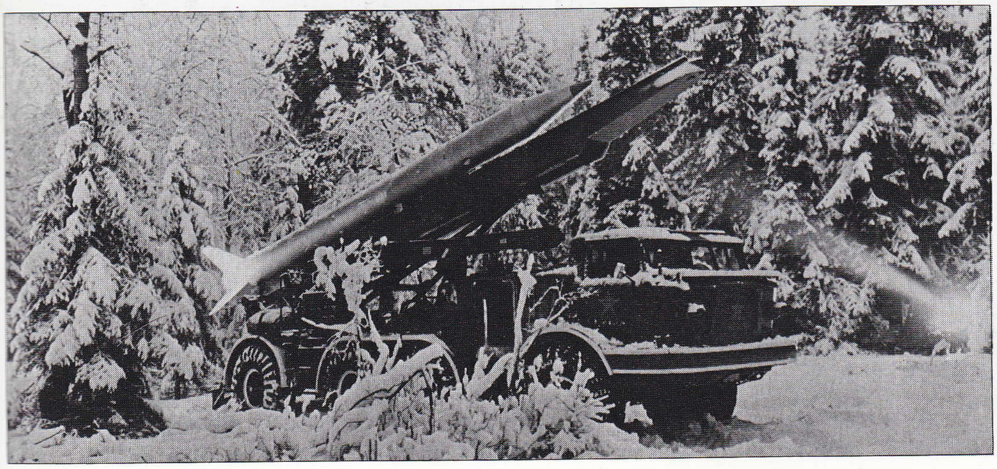
Combined-arms and tank armies

There are two types of Soviet ground armies, the combined-arms army and the tank army. The former normally consists of between two and four motorized rifle divisions, one or two tank divisions, and supporting elements. The latter can include an artillery brigade or regiment, a multiple rocket-launcher regiment, an artillery command and control battalion, a surface-to-surface missile brigade, an SA-4 'Ganef' anti-aircraft brigade (with 27 launchers), a chemical defence battalion, an engineer regiment or brigade, a pontoon bridge regiment, an assault crossing battalion, an intelligence battalion, an early warning battalion, a signal regiment and independent radio-relay battalion, a long-range reconnaissance company, a motor transport regiment, a radio and radar intercept battalion, a radio intercept battalion and a liaison helicopter element with 30 helicopters. It can also have an assault helicopter regiment (with 40 Mil Mi-24 'Hind-D/E' and 20 Mi-8 'Hip-C/E' helicopters) and an independent tank regiment.

The tank army generally has two to four tank divisions and one or two motorized rifle divisions, plus the same supporting units as the combined-arms army. It does not, in all probability, have the multiple rocket-launcher regiment, artillery regiment, artillery command and control battalion, and radar and radio intercept battalion of the combined-arms army. Although both types of armies are capable of independent operations, they are normally committed as part of a Front.

Soviet Fronts

A typical Soviet Front could have one or two tank armies and three or four combined-arms armies, but this combination and its supporting element do, of course, depend on its mission. In addition to the two types of army, a Front would also have an artillery division, two or three SS-23 'Scud' and one SS-22 'Scaleboard' brigades, two SA-4 'Ganef' surface-to-air missile brigades, a diversionary brigade, a chemical defence brigade, an engineer regiment/brigade, one or two pontoon bridge regiments, one to three assault crossing battalions, a signal brigade, specific radio jamming, radio intercept and radar and radio intercept regiments, an independent radio-relay battalion, air defence jamming and early warning regiments, a motor transport brigade, a pipeline brigade and an intelligence regiment. It could also be allocated a number of units under RVGK (Reserve of the Supreme High Command) control, including a signal brigade, a heavy-lift regiment, and an airborne/air assault division. The Front also has a tactical air army with over 400 aircraft including 222 fighter-bombers, 32 light bombers, 32 reconnaissance aircraft, 40 attack helicopters plus transport aircraft and helicopters.



Despite the picturesque setting, FROG-7 is an alarmingly unselective delivery system for chemical, nuclear and HE munitions. Although nearly 20 years old, it provides battlefield support to augment artillery firepower with a useful range of 70 km (43 miles). It is being replaced by the SS-21, a missile similar to the US Lance system.

12 PASS

Airborne divisions

In recent years the Soviet airborne divisions have been given a new lease of life and much new equipment. Each airborne division (or air assault division as it is more commonly known) has a divisional HQ, three airborne regiments, an artillery regiment, an ASU-85 self-propelled anti-tank battalion with 31 vehicles, an anti-aircraft battalion, an engineer battalion, a signal battalion, a parachute rigging and resupply battalion, a medical battalion, a maintenance battalion, a reconnaissance company and a chemical defence company.

Each airborne regiment has a regimental HQ, three airborne battalions, a mortar battery with six 120-mm (4.8-in) mortars, an anti-tank battery with nine BRDM-2s with 'Sagger' or 'Spandrel' ATGWs, an anti-aircraft battery with three SA-7 'Grail' surface-to-air missile launchers and six 23-mm ZU-23 towed anti-aircraft guns, an engineer company, a signal company, a parachute rigging and resupply company, a transport and maintenance company, a chemical defence platoon, a medical platoon and a supply and service platoon. The airborne battalion is the most important part of the regiment and has a total of 30 BMD tracked airborne combat vehicles, two BMD command vehicles and three BMDs without turret. Each battalion has three companies of vehicles, each company having 11 BMDs. The introduction of the BMD has meant that the airborne division is now almost fully motorized, and can thus conduct operations some distance from its drop zone. The BMD has the same turret as the BMP mechanized infantry combat vehicle, armed with a 73-mm (2.87-in) gun and a 'Sagger' ATGW, plus two bow-mounted machine-guns. The Soviets have seven airborne divisions, but can lift only one of these at a time, and this would leave other areas very short of transport aircraft. These divisions would play a major part in any future campaign in Europe, and have in recent years been employed as the Soviet equivalent of the US Rapid Deployment Force (or Central Command as it is now known). For example, they spearheaded the Soviet invasion of Afghanistan in 1979, and at least one division is still there today.

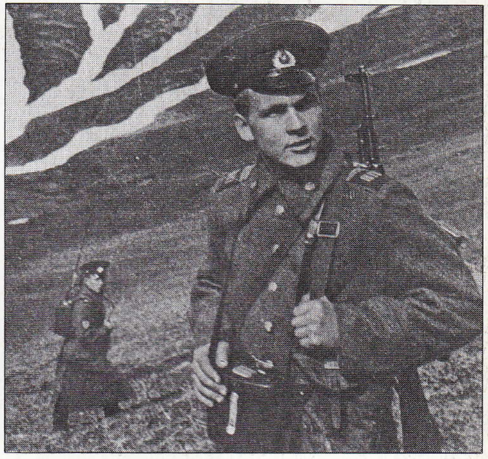
In addition to the airborne divisions the Soviets have also formed air assault brigades, each with a total strength of about 2,000 officers and men, as well as airmobile assault brigades each with a strength of about 1,700. The former is normally transported by tactical transport aircraft and its equipment is believed to include six 120-mm (4.8-in) mortars, 45 SA-7 launchers, six 23-mm ZU-23 towed anti-aircraft guns, six SD-44 85-mm (3.35-in) auxiliary propelled anti-aircraft guns, 68 BMDs and a host of anti-tank weapons, machine-guns, grenade-launchers and infantry weapons. The airmobile assault brigade has no armoured vehicles apart from four BRDM-2s so can be transported by helicopters.

Other forces

The Soviet army has a peacetime strength of around 1.8 million officers and men, but on top of this must be added the paramilitary forces which total about 450,000. The KGB has a strength of just under 200,000 and includes the border troops who keep a constant watch on the long frontiers of the Soviet Union. Their role is not only to stop people getting in, but in peacetime to stop Soviet citizens getting out of the country! The KGB is equipped with tanks and armoured fighting vehicles, and also has aircraft, helicopters and coastal patrol craft. In the border clashes with China in the 1960s the first units to encounter the Chinese were not the Soviet army but the border troops of the KGB. All along the borders of the Soviet Union is a restricted zone which can vary in depth up to 40 km (25 miles), and entry to this area by civilians is carefully controlled.

The MVD internal security troops number about 260,000 officers and men, and are subordinate to the Soviet Council of Ministers through the Ministry of Internal Affairs. The MVD is responsible for internal security matters such as riot control in support of the militia (police), for motor vehicle inspection and control, and so on. The internal troops are organized into regiments and divisions along lines similar to those of the Soviet army, and in time of war would probably be used to seal off the rear areas or to take over control of occupied territories as the main body of the army moved forwards.

Below: As well as spearheading Soviet operations such as the invasion of Czechoslovakia, KGB troops patrol the long borders of the USSR with unceasing vigilance. Equipped with a full range of armoured fighting vehicles and a naval element, the main task is to prevent unauthorized exit from the country.



Below: The 2S1 122-mm SP gun (formerly known in the West as the M-1974) is based on the MT-LB and mounts a version of the D-30 122-mm howitzer. Each artillery division and motor rifle division has 36 of these vehicles and each tank division 72.